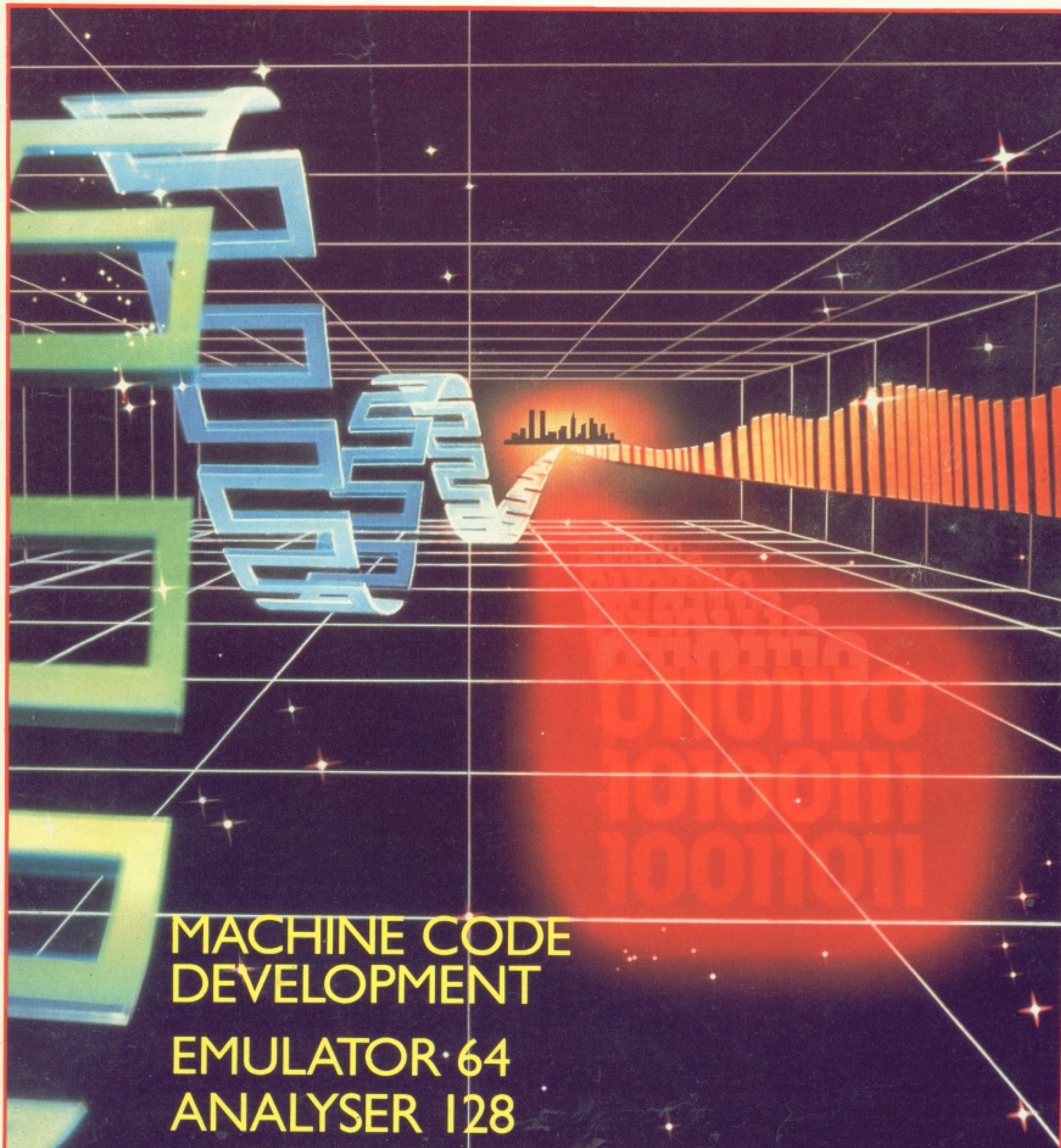
YOUR

COMMODORE

AN ARGUS SPECIALIST PUBLICATION

JUNE 1987 £1.10



◆ PLUS/4 DUAL PROGRAMMING ◆ PROCEDURES ON THE C64
◆ IMPROVE C64 LISTINGS ◆ WARGAMES AND WARLOCKS


STRETCH YOUR MIND ASVE
Take the next step forward into a dimension of computer entertainment where action and excitement take on a new meaning. From the world's greatest creator of simulation software comes an unbelievable collection of war games, fantasies and adventurous challenges.
No longer are you restricted to the confines of a gameplan, no longer are you reliant upon the abilities and limitations of a remote software programmer for your enjoyment. Here is a challenge in which you take complete control. You make the decisions and you manipulate the circumstances to meet your objectives. Here you are the true master, your destiny is not simply in the speed of your reflexes, it's in the power of your mind as well.
CBM 64/ APPLE
BALTIC 1985
Can you lead the West Germans into West Berlin and free it from Soviet domination.
£24.99
CBM 64/ APPLE/ ATARI
USAAF
As a General in charge of 8th and 15th Air Forces, plan your assaults over 90 possible targets.
£29.99
CBM 64/ APPLE/ ATARI
BROADSIDES
Captain an 18th Century warship in this game. Return to the Swash Buckling battles against Pirates.
£24.99
CBM 64/ APPLE/ ATARI/ ST
COLONIAL CONQUEST
This Award Winning Simulation lets you fight for World domination during the Age of Imperialism.
£24.99/£29.99
CBM 64/ APPLE
RDF 1985
Defend Saudi Arabia from attack by Soviet Forces using the US Rapid Deployment Forces.
£24.99
CBM 64/ APPLE/ ATARI/ IBM/ ST
PHANTASIE
Transform your character from a thief to a wizard while you track down the Nine Rings.
£19.99/£24.99
CBM 64/ APPLE/ ATARI/ ST
PHANTASIE II
Remove the Curse of the Dark Lord, to do so, you need the Evil Orb.
£19.99/£24.99
CBM 64*/ APPLE/ ATARI
VIETNAM
Control the US Army through 6 historic Vietnamese operations.
£14.99/£19.99
CBM 64*/ APPLE
GERMANY 1985
When "Superpowers" collide Nato forces must repel the Soviet invasion of West Germany.
£14.99/£19.99
CBM 64*/ APPLE/ ATARI*
BATTALION COMMANDER
Command a modern armoured Battalion against the computers real-life simulation.
£14.99/£19.99
CBM 64/ APPLE/ ATARI/ AMIGA
MECH BRIGADE
This is the most modern armour warfare program which features 70 different weapon types.
£29.99
CBM 64*/ APPLE/ ATARI
FIELD OF FIRE
Asume command of the First Infantry and relive the storming of Omaha Beach on D-Day.
£14.99/£19.99
CBM 64/ APPLE/ ATARI
CARRIER FORCE
Encounter the real drama of 4 famous battles during WWII in the Pacific.
£29.99
CBM 64/ APPLE/ ATARI/ AMIGA
FIGHTER COMMAND
Defend your country during the Battle of Britain using this superb strategic-level simulation.
£29.99
CBM 64/ APPLE/ ATARI* / IBM
KNIGHTS OF THE DESERT
Battle with armoured tanks against opposing enemies during the North American Campaign 1941-42.
£14.99/£19.99/£24.99
CBM 64/ APPLE/ ATARI /IBM
TIGERS IN THE SNOW
Hitlers final desperate attempt to win WWII is recreated during this simulation of the Battle of the Bulge.
£14.99/£19.99/£24.99
CBM 64/ APPLE/ IBM/ ST
ROADWAR 2000
Travel forward in time when you search the gang lands for 8 scientists. The roads are treacherous when fuel is in short supply.
£19.99/£24.99
CBM 64/ ATARI
WARGAME CONSTRUCTION SET
Unleash your imagination and now create your own scenarios, historical, modern, fantasy or even Battle for the Stars.
£19.99

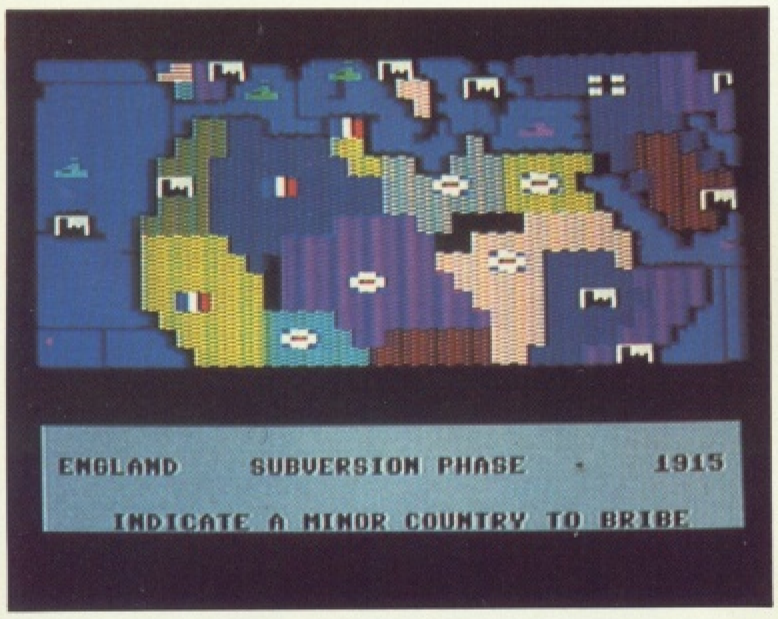


ASWELL AS YOUR FINGERTIPS
CBM 64/ APPLE
BATTLEGROUP
The Western Front is being threatened, could you take control and repel an attack.
£29.99
CBM 64/ APPLE/ ATARI/ AMIGA/ IBM
KAMPFGRUPPE
This is a tactical game of armoured warfare on the Soviet Front from 1941-45.
£29.99
APPLE/ ATARI
WAR IN RUSSIA
This game requires skill in controlling every division of the Russian Campaign during WWII.
£29.99
CBM 64/ APPLE/ ATARI*/ IBM
BATTLE FOR NORMANDY
Guide the troops during that furious day in June 1944 on a French Beach, D-Day.
£14.99/£19.99/£24.99
CBM 64/ APPLE/ ATARI/ IBM
GETTYSBURG
The outcome to this game could change the course of American History from the Civil War.
£29.99
CBM 64/ ATARI
WARSHIP
Control sides during this surface naval warfare simulation in the Pacific during WWII.
£29.99
CBM 64/ APPLE/ ATARI
PANZER GRENADIER
This program puts you in charge of an elite regiment of infantry attacking Russia under Hitler's direct orders.
£24.99
CBM 64/ APPLE
GEOPOLITIQUE
Outwit the computer in a political, economical and military struggle for world dominance.
£24.99
CBM 64/ APPLE/ ATARI
COMPUTER AMBUSH
Hand to hand combat is the only way to win the war in this WWII game.
£29.99
CBM 64/ APPLE
NORWAY 1985
Nato's ski infantry try to regain Norway from Soviet control, can you plan the attack.
£24.99
CBM 64/ APPLE/ ATARI/ IBM
BATTLE OF ANTIETAM
Relive the bloodiest day in American History, the Rebels threaten to escape, so you must stop them.
£29.99
CBM 64/ APPLE/ ATARI
GEMSTONE WARRIOR
Search the deadly Netherworld for the magical Gemstone in this exciting action-strategy game.
£19.99
CBM 64/ APPLE/ ATARI/ AMIGA/ IBM/ ST
WIZARDS CROWN
Guide a valiant band of Adventurers to recover the precious Wizards Crown.
£19.99/£24.99
CBM 64/ APPLE/ IBM/ ST
RINGS OF ZILFIN
Search for the lost ring of the Wizard Zilfin to become Grand Master Wizard.
£19.99/£24.99
CBM 64/ APPLE/ ATARI / IBM/ ST
SHARD OF SPRING
Hunt the Sorceress for the stolen Shard and bring prosperity back to your island.
£19.99/£24.99
CBM 64/ APPLE
GEMSTONE HEALER
Recover the healing tool and revive the Gemstone's power but beware one mistake could be catastrophic.
£19.99
CBM 64/ APPLE/ ATARI
QUESTRON
Defeat the Wizard Mantor and recover the Evil Book but beware of his hideous defence.
£19.99
CBM 64/128/ APPLE/ ATARI
REALMS OF DARKNESS
PHANTASIE III
WAR IN THE SOUTH PACIFIC
BATTLECRUISER
Coming soon £19.99
U.S. GOLD
All American Software
U.S. Gold Ltd., Units 2/3 Holford Way, Holford, Birmingham B6 7AX. Telephone: 021 356 3388
Telex: 337268
STRATEGIC SIMULATIONS INC
* Available on Cassette £9.99

CONTENTS

VOLUME 3 NUMBER 9

FEATURES



REGULARS

PROGRAMS AND UTILITIES

DATA STATEMENTS

*T*halamus has launched *Delta*, a new game from *Sanxion* programmer Stavros Fasoulas. Delta is described as a 'progressive' shoot 'em up and has 32 levels and 162 different alien attack waves. It's available for the C64 on cassette at £9.99 and disk at £14.99.

Sanxion and *Delta* will soon appear in the US on the Electronic Arts label. Paul Cooper of Thalamus said: "We were approached by a number of leading US software hoses but felt that Electronic Arts could promote our products more successfully. Thalamus looks forward to working with Electronic Arts in this new venture".

Gremlin has also crossed the Atlantic to strike a new business deal with Canadian Software development company, Acme Animation, headed by games designer Michael Bate. There are two programs already being developed, a flight simulator and an arcade game which are due for release at the end of this year. Gremlin will be looking for programmers to send to Canada for the new project.

Gremlin's Ian Stewart said: "The opportunity of working with Michael Bate, gives us the opening into the US market that we have been waiting for. This will establish Gremlin as an international company and is only the start of something that will be envied by the industry during 1987!"

Michael Bate commented: "The chance to be associated with one of the world's most dynamic companies was an opportunity I couldn't pass up."

Please Note

We have been informed that many people are getting *Micronet's* phone number wrong and annoying the neighbours with their calls. Please note that *Micronet* can be contacted on: **01 278 3143.**



Virgin Games

Incentive has recently released its *Ket Trilogy* as a games package on the cassette.

The Trilogy is comprised of three seperate adventures: *Mountains of Ket, Temple of Vran* and *The Final Mission.*

You have been called in to save the land of Ket from viscious attacks from the Mad Monks in the mountains.

The Lords of Ket send you on a mission to kill King/High Priest Vran Verusabel and Delphia, the High Princess of the Temple of Vran. Only with their deaths can you stop the attacks on Ket.

The entire trilogy is available on one cassette for the C64 at £7.95. The Commodore version also includes a special feature: auto map drawing. As you explore in each adventure a map of your travels builds up on the screen.

Virgin Games has released a new compilation, *Now Games 4*. The new package features *Dan Dare, Hacker, Back to the Future, Mission Omega* and *Jonah Barrington's Squash* and is available for the C64 at £9.95.

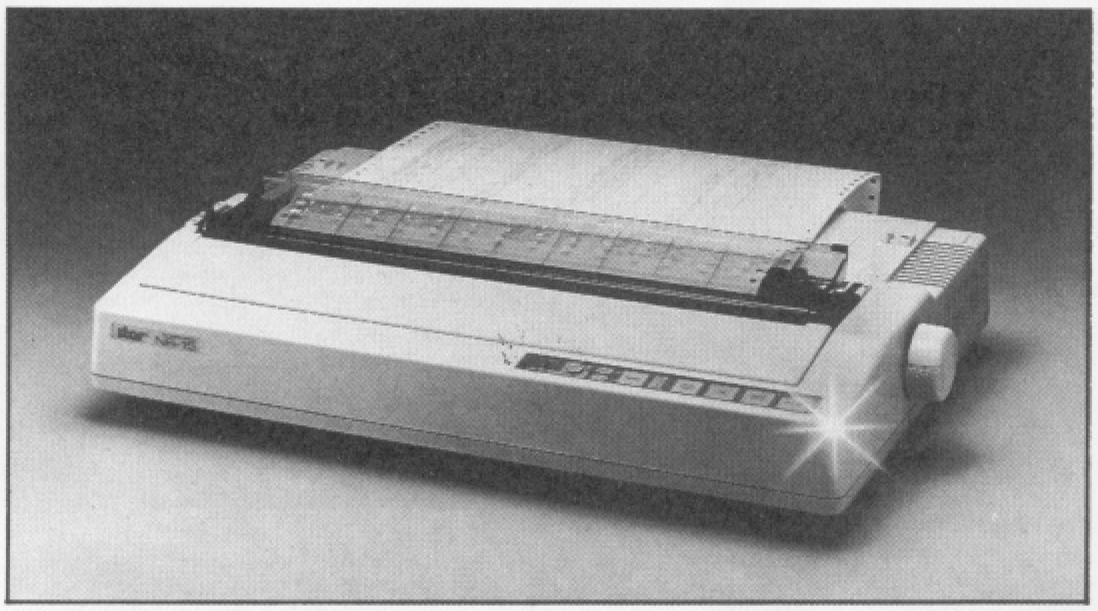
Virgin's Nick Alexander said: "We are already into six figure sales with the Now series and *Now Games 4* is the strongest line up yet. Now is a wow!"

Budget software house Code Masters has added another title to its C64 list. *Armourdillo* features a half-man, half animal armour plated living tank as the plant Mobanti's last hope of defence against evil aliens. Written by Giulio Zicchi, *Armourdillo* is a fast scrolling shoot 'em up featuring music and sound effects.

Touchline

Incentive Software: *2 Minerva House, Calleva Park, Aldermaston, Berks RG7 4QW.* ***Tel:*** *07356 77288.* ***Virgin Games:*** *2-4 Vernon Yard, Portobello Road, London W11 2DX.* ***Tel:*** *01 727 8070.* ***Code Masters:*** *1 Beaumont Business Centre, Beaumont Close, Banbury, Oxon OX16 7RT.*

DATA STATEMENTS



The Star NR-15

Print Outs

Star Micronics has launched its latest dot-matrix machine the *NR-15.* It provides draft printing at 240 characters per second (cps) and near letter quality output at 60cps.

A font control panel makes the new printer extremely simple to use by providing touch sensitive control for the major functions.

As standard the *NR-15* is equipped with both tractor feed and semi-automatic sheet feed, there is also an optional, low-cost automatic cut-sheet feeder.

Another feature is slot interface card system, which makes system connection problems relatively easy to solve. By selecting the right card the user is guaranteed a perfect match with his computer system.

The *NR-15* is priced at £589.

Citizen Europe has also added to its product range. The *MSP 50* and *MSP 55*, new nine pin dot matrix printers.

The new printers are 80 and 136 column and offer the user top quality, high speed printing with optional colour enhancements for professional data processing.

Both printers carry push and pull feed tractor as standard with bottom feed to aid multi-part stationary feeding. Both will be available this summer. The *MSP 50* will cost £695 (ex VAT) and the *MSP 55* will cost £525 (ex VAT).

Touchline
Star Micronics: *Craven House, 40 Uxbridge Road, Ealing, London W5 2BS.* ***Tel:*** *01 840 1800.* ***Citizen:*** *Fitzroy PR, 32 Fitzroy Square, London W1P 5HH.* ***Tel:*** *01 388 9871 or 0895 72621.*

More from Domark

Keeping the impetus going in the *Trivial Pursuits* craze, Domark has announced the release of the *Body Boomer* edition on the C64.

The *Baby Boomer* edition contains questions in six new categories all connected with the post war baby boom era.

The *Baby Boomer* edition will be available as a complete game pack for £14.95, comprising the new question pack and the full game program. If you already have a *Trivial Pursuit* game pack then you need only buy the extra questions pack at *£7.95*.

Domark has also obtained the computer game rights to this summer's new Bond film, *The Living Daylights.*

Licensed from the producers of the James Bond Film, the game closely follows the storyline of the film which is the first Bond movie to feature Timothy Dalton in the starring role.

Both the film and the game will be launched this summer, the C64 version will be out in mid-July.

Touchline
Domark: *Domark House, 22 Hartfield Road, London SW19 3TA.* ***Tel:*** *01 947 5622.*

Amiga News

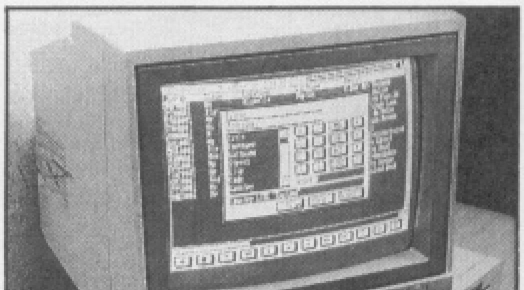
Micropose has launched *Silent Service* for the Amiga.

The game is a simulation of a World War II submarine in the South Pacific.

All the submarine's critical battle stations have been reproduced — the engine room, ship's bridge and conning tower. Lifelike sound effects of the sea engine and submarine klaxon add to the reality.

Stewart Bell, head of Microprose in the UK, said: "It's the tremendous graphics capability of the Amiga that makes it ideal for Microprose simulations, which are the most realistic in the market. We plan to release more titles for the Amiga in the future."

Precision Software has achieved great success in the US market with the Amiga *Superbase Personal* database. The package has reached number four in the American best seller chart.



Personal Superbase from Precision

Nigal Lovatt-Turner commented: "The demand for *Superbase Personal* on the Amiga has taken even us by surprise. We seem to have achieved a very high percentage of sales to existing users already so we are anticipating outstanding sales when the new Amigas start to sell in volume this year."

Superbase Personal is a database which has no limits on the number of fields or size of the record. As many

DATA STATEMENTS



Silent Service from Microprose

files as needed can be opened up to build up a relational report.

The cost of *Superbase Personal* is £149.95 including VAT.

Touchline
***Microprose:** 2 Market Place, Tetbury, Gloucestershire GL8 8DA. **Tel:** 0666 54326. **Precision:** 6 Park Terrace, Worcester Park, Surrey KT4 7JZ. **Tel:** 01 330 7166.*

Springing Back

Gremlin has announced the imminent release of a follow up game to *Things on a Spring*. This old character has been brought out of the cupboard to star in a new game entitled. *Thing Bounces Back*.

Having dealt with the Toy Goblin in his previous adventure, Thing must now set about stopping the toy factory automatically producing evil toys.

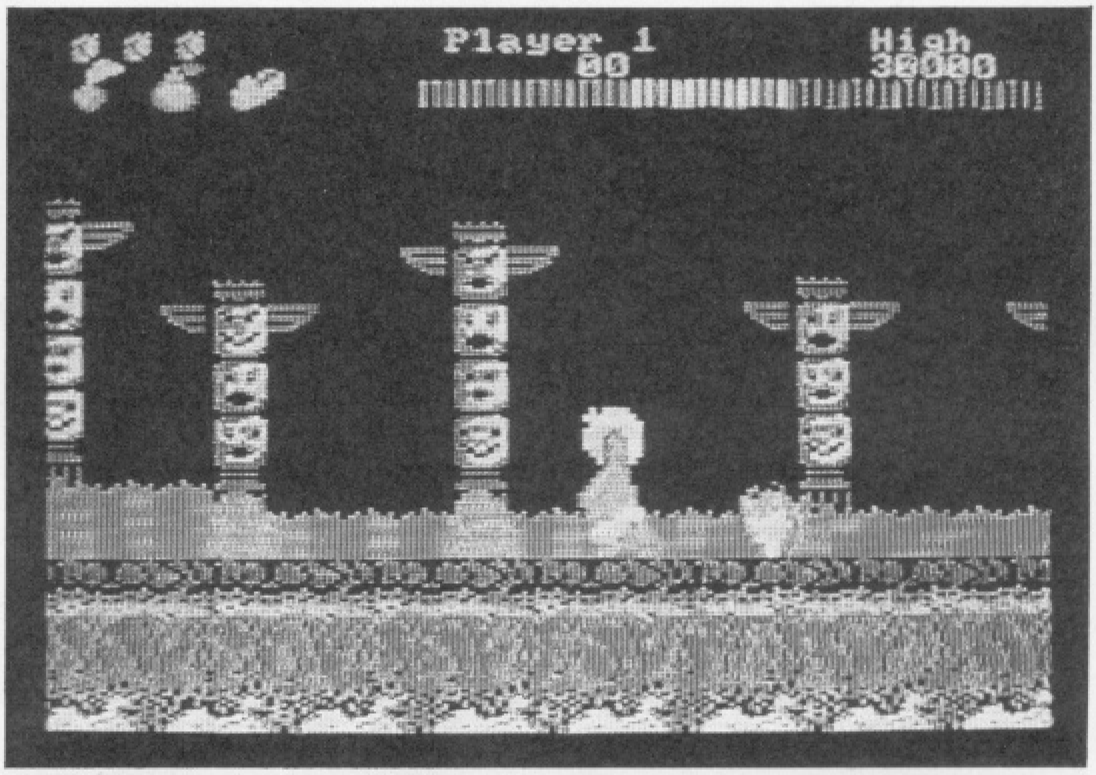
There are perils galore. Water rushes at him as he travels around the pipe network, surfaces explode under his spring and iron chickens aim alien filled eggs at his head.

The new game will be on the C64.

Also for the C64 from Gremlin is *Convoy Raider*, a strategic war game in which you must patrol the coastline of the inner sea using modern weapon systems, including sea wolf missiles, excocets and an anti-submarine helicopter.

The fate of the free world lies in your hands. Look out for this new title in May.

Touchline
***Gremlin:** Alpha House, 10 Carver Street, Sheffield S1 4FS. **Tel:** 0742 753423.*



Wonderboy

Activision Action

The Electric Dreams arm of Activision has announced that it has gained the licence for *Star Raiders II*, a galactic adventure.

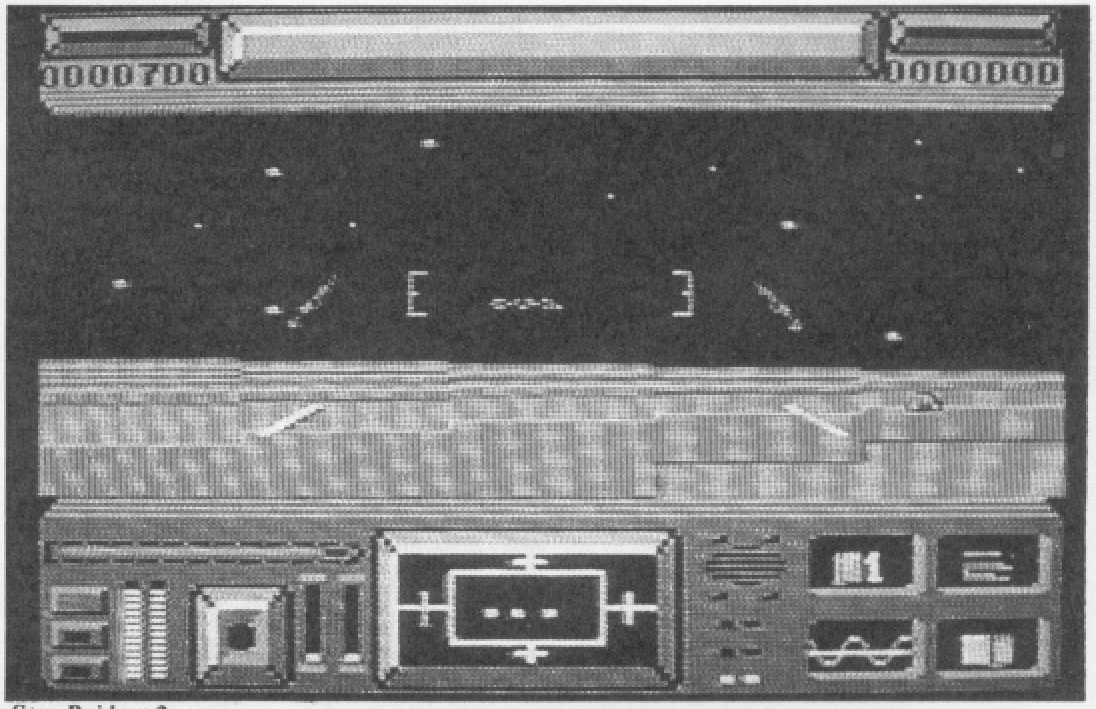
The future of the Atarian federation is in your hands as the evil Zylon master, Chut, plans to destroy the Celos IV star system. You must pilot the Liberty Star, in order to wipe out the Zylon Master force and its base.

The new game should be in the shops now and costs £9.99 on C64 cassette and £14.99 on disk.

Also from Activision for the C64 is *Wonderboy*. *Wonderboy* is a hero in a nappy. His quest is to reach his girlfriend, however there are numerous hazards littering the landscape to be crossed. Luckily he can break open eggs, collect an axe, a guardian angel and other useful items. A skateboard can speed things up and picking fruit can give you bonuses.

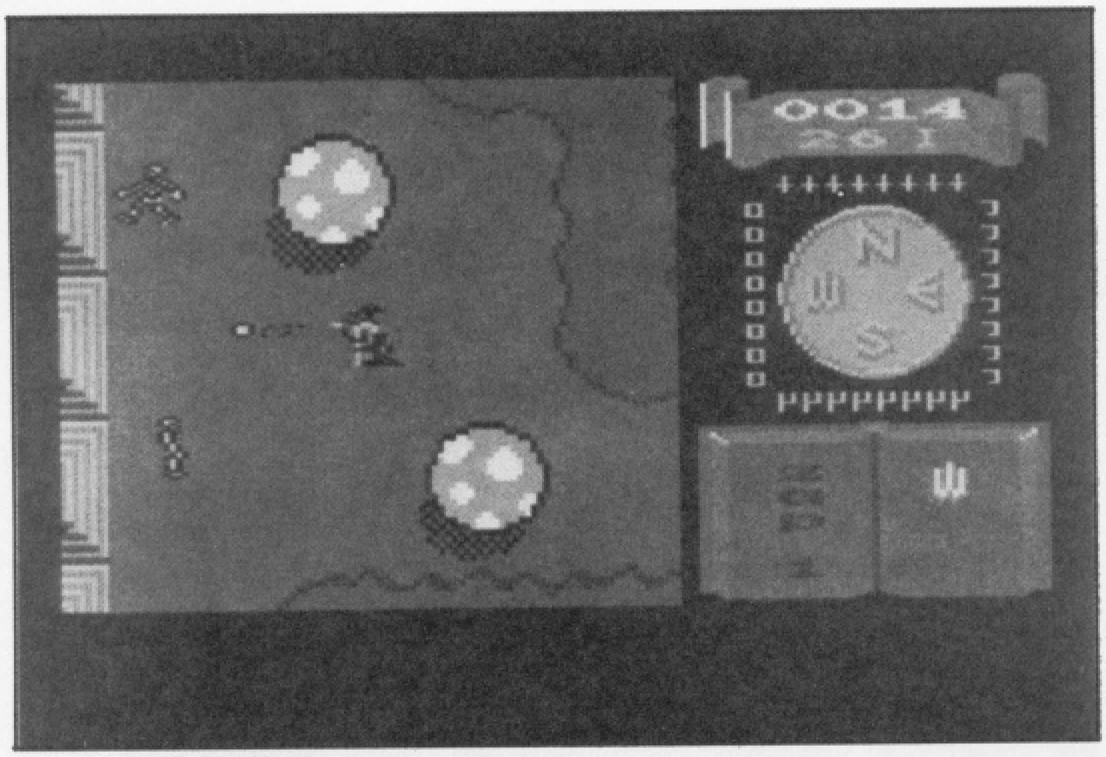
Wonderboy will be available in May at £9.99 on cassette and £14.99 on disk.

Touchline
***Activision:** 23 Pond Street, Hampstead, London NW3 2PN. **Tel:** 01 431 1101.*



Star Raiders 2

DATA STATEMENTS



Wiz from Melbourne House

Arcadia

There are several arcade titles which have been released recently.

CRL has announced *Traxxion* for the C64, an arcade shoot 'em up planned for June. *Traxxion* is a construction site satellite orbiting Reema, one of the Tau Ceti planets. It is a flat, rectangular platform with a complex series of magnetic monorails on which maintenance cars drive. A slab of concrete covers this and maintenance cars drive beneath it. The satellite has been damaged in a war and now the reactor has started to meltdown. You must find the exit from the monorail system before *Traxxion* is destroyed.

Wiz is a new game from Melbourne House featuring Midgard, a world almost entirely populated with magicians, sorcerers and wizards. You start as an apprentice who wants to become a fifth level King Wizard. Your aim is to fill up your spell book and collect ingredients for magic rites. However, a parallel evil world keeps intruding upon you and you must face its population of grotesque misshapen monsters.

Wiz will be available in June on C64 disk at £14.95 and cassette at £9.95.

Martech has announced the imminent release of a new arcade adventure. *Catch 23*, for July this year. (C64 format).

Catch 23 is a Star Wars type program featuring the CK23, an orbital interceptor, belonging to an enemy power. It remains stationary in orbit until danger strikes, then it re-enters the atmosphere to destroy missiles or aircraft with its sophisticated laser weaponry. LThe CK 23 is still located at its test site, a lonely deserted island, heavily guarded. You must steal the secret of the design of the CK 23 and then set off an explosion which will destroy the whole island.

It will be available for £8.95 on cassette and £12.95 on disk.

Touchline

CRL: *9 Kings Yard, Carpenters Road, London E15 2HD.* ***Tel:*** *01 533 2918.* ***Melbourne House:*** *60 High Street, Hampton Wick, Kingston-upon-Thames, Surrey KT1 4DB.* ***Tel:*** *01 943 3911.* ***Martech:*** *Martech House, Bay Terrace, Pevensey Bay, E. Sussex.* ***Tel:*** *0323 768456.*

Utilities

System Software has recently made available *Hack-Pack 64*.

Hack-Pack 64 is a C64 utility pack containing a full feature Tooklit for Basic programmers, which places many new commands at their disposal to make Basic programming more effective.

The package contains the SSol Compressor which will reduce a program to its minimum size.

Included with *Hack-Pack* is the *Ram Disk. Ram Disk* allows the user to set up areas of the C64's Ram as a fast 'disk drive'. The price of the package is £24.95 inclusive.

Touchline

Systems Software: *16B Worcester Place, Oxford OX1 2JW.* ***Tel:*** *0865 54195.*

Adventure Line

Following the success of *The Pawn*, Firebird has just released another Magnetic Scrolls adventure — *Guild of Thieves*.

At the start of the game you must apply to the Guild of Thieves and tests will be set to prove your worth. The task you are given in the game will be set according to your original status.

The parser used in *The Pawn* will also form an integral part of *Guild of Thieves* and the whole game is set in the legendary land of Keovnia which will be familiar to Pawn players.

The C64 version consists of two disks and costs £19.95.

Lord of the Rings fans will be pleased to hear that the second part of the *Lord of The Rings* trilogy from Melbourne House will be available soon. Entitled *Shadows of Mordor*, the game closely follows the story line of the second part of the *Lord of The Rings, The Two Towers*, although the player can deviate from this and experiment with alternative strategy. *Shadows of Mordor* also feature Inglish, the language specially developed to make input easier. The computer can understand virtually any sentence up to 128 characters long and has 800 words in its vocabulary.

The game will be available at the end of June 1987 on C64 disk for £14.95.

Touchline

Rainbird: *First Floor, 74 New Oxford Street, London WC1A 1PS.* ***Tel:*** *01 240 8838.* ***Melbourne House:*** *60 High Street, Hampton Wick, Kingston Upon Thames, Surrey KT1 4DB.* ***Tel:*** *01 943 3911.*



C
they c
qualit
promi
strateg
SS
Inc. w
scienc
US G
pond
Germ
latest
follov
T
one c
fanta
of Zi
2000
infan
Briga
cons
com
type
V
instr
Mos
the f

Fa

Fan
the
thre

Warlocks and Wargames

American software house, SSI, has recently launched a new offensive in this country, with an impressive selection of strategy games. Here, we look at just a few of them.

By Tony Hetherington

Computer strategy games have yet to achieve the success they deserve with only a handful of companies producing quality wargames. Now, an American company, SSI, promises to unlock your imagination with its own style of strategy games.

SSI stands for the California based Strategic Simulations Inc. which has a mammouth catalogue of war, fantasy and science fiction games that are now being imported through US Gold. Some SSI games have already travelled across the pond and titles such as *Knights in the Desert, Vietnam* and *Germany 1985* have all received impressive reviews. SSI's latest catalogue contains over 50 C64 simulations, the following games are just the tip of the iceberg.

This month's game of the month, *Colonial Conquests*, is one of the latest batch of imports that also contains the fantasy games *Gemstone Warrior, Shard of Spring* and *Ring of Zilfin*; the science fiction battle for survival in *Roadwar 2000* and war between galleons in *Broadsides;* Hitler's elite infantry in *Panzer Grenadiers* and modern forces in *Mech Brigade*. The standard and complexity of the games vary considerably from the easy-to-play *Colonial Conquest* to the complexity of *Mech Brigade* that even includes a listing to type in to help you play the game!

Whatever the game they are all supplied with full instructions and even the odd hint sheet to get you going. Most feature full joystick controls to let you concentrate on the tactics of success.

Fantasy Games

Fantasy roleplaying games have enjoyed enormous success, the best being the Ultima series but now SSI has released three totally different approaches to this intriguing format.



Shard of Spring

The Shard, a fragment of the enchantent stone, worked its magic on the island of Ymros for thousands of years maintaining a blissful climate by shutting out the storms of winter. Now this has been stolen by an evil sorceress who has ransomed the land into abject poverty. Your quest is to raise a party of human, elf, dwarf, troll and gnome wizards and warriors to free the land from this tyranny.

Before you begin your quest you must build a party of five brave heroes by selecting the character utilities included on the game disk. Each character can be any of the five races and their strength, intelligence, speed, intellect, endurance and skill is decided at random. These can be selected a maximum of three time to increase your chances and are adjusted depending on the race of your character. For example trolls are strong and tough critters but aren't renowned for their speed or intelligence. Next you assign a

class which can only be warrior or wizard and then finally skills.

The skills set this game apart from any other as you can tailor your party to fit your needs. Warriors can be given weapon skills, karate, beserking or hunting (finds food for the party) and wizards can learn the spells of the fire, wind, ice and spirit runes as well as learn weapon, potion, monster and item lore or even the divine art of priesthood.

These skills are invaluable to your quest as a wizard with weapon and item lore can identify objects that you find (otherwise you can't use them), priests can dispell the undead monsters and the rune classes decide the spells you can cast.

The first stage of your quest is survival particularly when you're attacked by zombies, skeletons, giant snakes and spiders as well as other wizards and warriors! During combat the normal screen display, which shows a single character moving over the terrain, expands to show the whole party and the creatures they are fighting. Now your speed is the crucial factor as this decides the number of movement points the character gets each battle turn. These are vital as it costs two movement points to move but also three for every attack you make! So fighters with high speed and strength factors get several damaging attacks in every round.

The wizards can join in the fighting, or can help by casting spells such as fire storm, hail storm and tempest that delivers damage to an area (hopefully containing all the monsters and no party), armour and ice shield protection spells and healing spells to patch up the fighters after the battle.

The spells cost a varying number of spell points (a wizard is assigned sell points depending on his intelligence) that add clout to the damage spells and power to the protection. The spell points can be regained by resting and should be used wisely as a well timed spell can save the day.

As your party fights its way through the wilderness, dungeons, towns and ruins of the land, they will gain gold to buy equipment and food and experience points with which they can progress through the levels until finally they have enough strength, weaponry and spell power to defeat the sorceress.



Rings of Zilfin

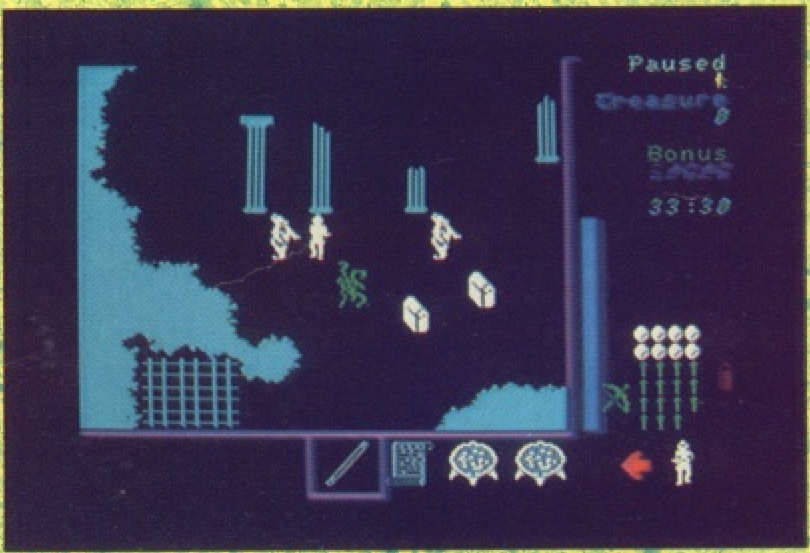
You're on your own in this fully animated adventure in which you must race to find the second ring of Zilfin before the evil Lord Dragos gains the pair of them and supernatural powers. You play Reis, a wizard warrior of Batiniq, who must grow in strength and power as the quest unfolds.

The playing time for the game is estimated at between 30 to 40 hours so be prepared to go slowly.

Dragos' castle lies to the north but before you go there you have a lot to do. You must collect the magic mushrooms from the side of the road that will heal your wounds, protect you from poison and aid your combat. You must fight the goblins, trolls, shape shifters and other monsters that pollute the land to earn gold and experience. Trade with the villagers to gain the weapons you need and talk to the locals to learn the legends and rumours.

The game is entirely animated by tiny characters that play out the story. When you enter a town or encounter a monster the screen expands and uses windows to pile as much atmopshere into the game as possible.

I found the game to be overly complex and reliant on unusual concepts such as the constant need to collect mushrooms and the weird and wonderful spell names such as Buzzap, Ekbert, Jazzip and Zytrom. I prefered the more classical style of role playing found in the *Shard of Spring*. *The Rings of Zilfin* is the bigger and more detailed game packed full of rumours and intrigue but is for a solo adventurer which, for me, lacked the excitement of guiding a party.



Gemstone Warrior

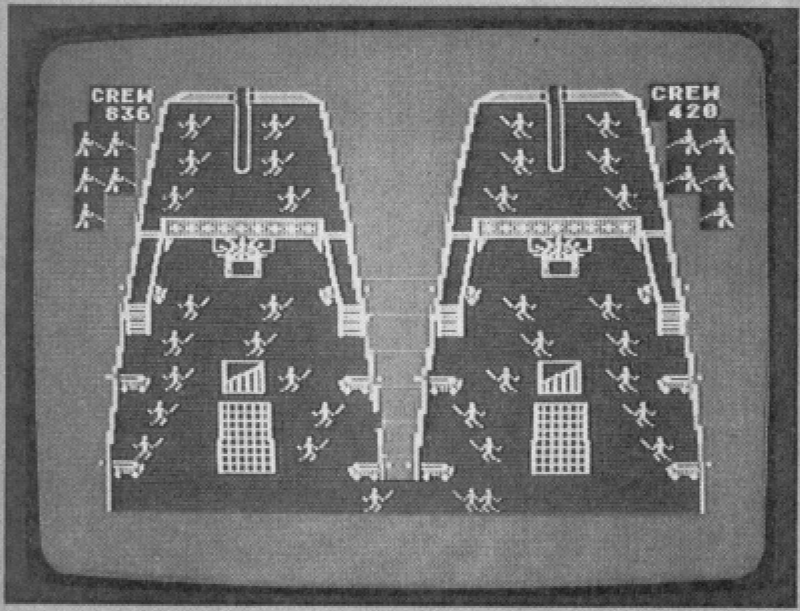
Gemstone Warrior is the closest SSI gets to an arcade game as our joystick controlled hero searches the caverns of horror for the five pieces of the powerful gemstone. Our sword slaying, arrow firing, fireball blazing hero explores the caverns through archways, doors and grates to do battle with skeletons, ghosts, demons, giant amoebae and exploding gas plants to plunder treasure and glory.

Just because it looks like an arcade game doesn't mean it isn't packed full of strategy. Certain monsters carry specific magical and useful items. Knowing what to kill when, could save your life. The objects you find by opening chests and coffins all have a use. Goblets (heal), wands (freeze), rings (invisibility) and scrolls (illusion) all have documented uses but what about the ornate daggers, flowers and dice? How you use the objects and which weapons you use against the various adventurers chomping monsters could lead you to a successful quest or an untimely end.

These factors add the expected depth to an all action arcade adventure that makes a refreshing break from the mind boggling simulations.

Wargames

Wargames simulations are the bread and butter programs of SSI's catalogue but contain an incredible variation of conflict and combatants. The following games highlight this variety of not only game type and style but also complexity from games that take 15 to 20 minutes to play to those requiring 10 hours of constant concentration.



Broadsides

Swashbuckling action on the high seas is the name of the game as great galleons meet in conflict between rival captains and their crew.

The main screen shows both ships as they approach each other with crew, orders, ship damage and speed displays on the left.

The two captains enter their commands through joystick control which orders the ship to turn to the port or starboard, aim at the hull or sails, increase or decrease speed and fire. In the advanced game you can also select sails, to fire grape shot or cannon and even design your galleon from scratch.

Later once the cannons have taken their toll on the ships and their rigging they will close and the boarding parties will battle with sabres as the snipers menace with muskets.

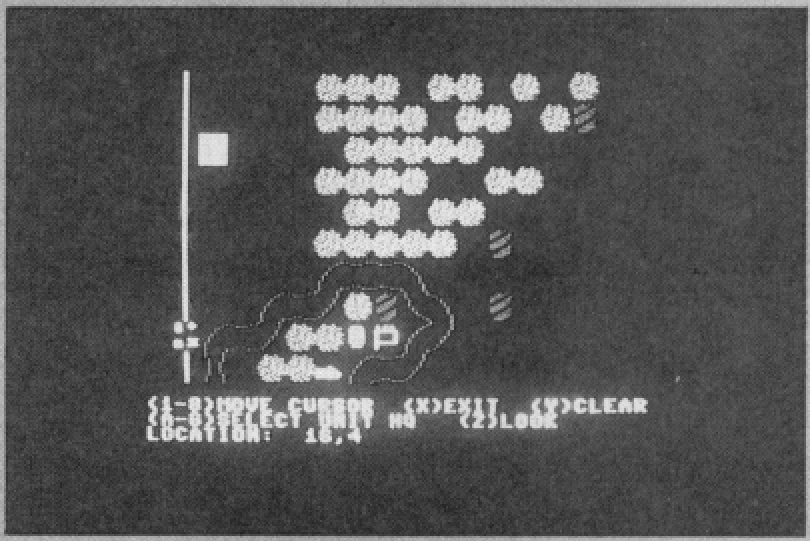


Panzer Grenadier

The problem with infantry is that they're essential when actually taking the territory of a battleground but they can't keep up with the trailblazing battle tanks. The Panzer Grenadiers changed all that as they were soldiers riding halftracks, trucks and armoured cars and rapidly became Hitler's elite force. In *Panzer Grenadier* you control this force in a series of scenarios on the eastern front in which you must take and hold crucial bridges and break up Russian counterattacks.

The game looks like the product of the authors' *Wargame Construction Set* (also in the first batch of imports) which is the wargame equivalent of the Quill. Thirty one units on either side can be fully set up to fight as wizards, tanks or starships on a definable scrolling map. In this game the units are the troops, mortars, machine guns, motorcycles and tanks of the grenadiers and their opponents.

I found the unit counters to be a little too small for comfort and as a result I would recommend you get the construction set and build your own scenarios.



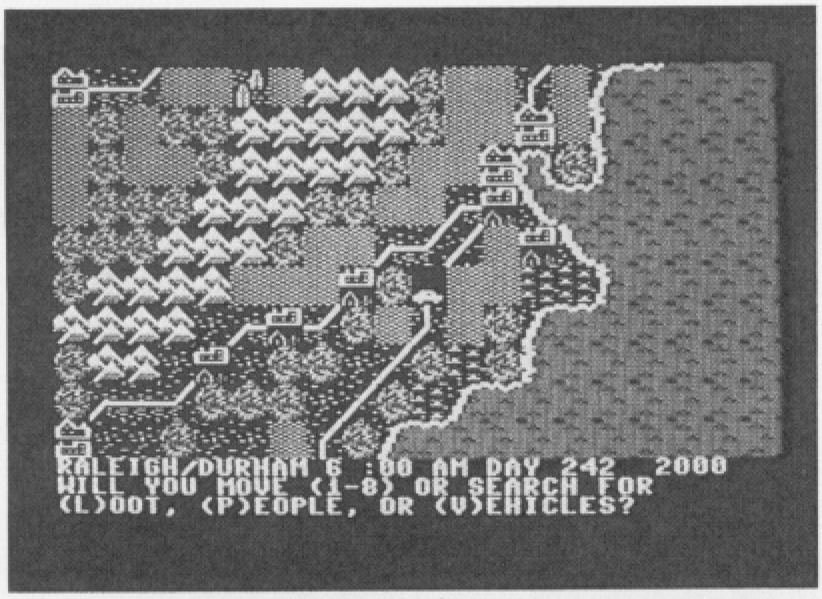
Mech Brigade

There are only a few computer wargames that actually need a computer other than to provide an opponent. *Mech Brigade* is one of them. Although you control units representing the tanks, artillery, helicopters and armoured vehicle of modern warfare the computer stores and uses the ratings of front and back armour, size, speed, number of guns, gun range, gun penetration, gun accuracy, shell size and missiles carried for each and every vehicle.

The game simulates war between East and West in the 1990's and pits Nato Apache AH-64 helicopters, Bradley and Abrahams tanks against Hind helicopters T-72 tanks and ZSU23 self propelled guns. Don't be surprised if these units sound familiar as the Apache helicopter is better known as the Gunship and the other units are the ones you meet in the Western europe scenario.

Mech Brigade is undoubtedly a complicated game and deserves its advanced label and three hour playing time but, despite this, it is still remarkably playable. Single letter commands are used to issue orders to your units in the games four scenarios or in a scenario you have built yourself. One of the most useful commands, surprisingly not found in other wargames, is the view command that highlights the area in a specified units line of sight. This is crucial to deciding combat tactics and is incredibly annoying in other games when your attacks are disallowed for a surprising "no line of sight" decision. Now there are no doubts.

The combination of tanks, guns, infantry, guided missiles and of course helicopters make this a fascinating and challenging game.



Roadwar 2000

Roadwar 2000 presents the challenge of a battle of survival in a disease and nuclear devastated America. Suicide squads from an unknown enemy infected the nation with a deadly virus that then mutated when the Russians launched nuclear strikes.

Now the country is run by feudal gangs led by fanatics like you.

Your job as gang leader is to build up your rabble from humble pedestrian beginnings to the toughest mobile fighting force in the west.

You'll have to loot cities and farmland for food, medicines and supplies, search for useable vehicles such as sports cars, trucks and motorbikes, and recruit new gang members to swell your ranks while battling with other gangs, mobs and the dreaded infected mutants. Gradually, your gang will improve in number and quality, ride better vehicles, armed with metal found in foundaries and one day may be strong enough to take cities such as New York.

More to Come . . .

That's just the tip of the iceberg as SSI games are set to swamp the strategy scene with American Football, Baseball, golf and boxing sports simulations, *The Cosmic Battle* and *Imperium Galactum* for science fiction freaks, *Gemstone Healer, Wizard's Crown* and the *Phantasie* trilogy for fantasy fans and wargames covering all fields of battle from the past to the present and into the future.

It's difficult to pick out any favourites from this group of excellent and varied games but two stand out head and shoulders above the rest for pure and simple playability. They are *Colonial Conquests* and *Shard of Spring*. YC

Touchline

SSI: *US Gold, Units 2/3, Holford Way, Holford, Birmingham B6 7AX.* ***Tel:*** *021 356 3388.*

Letters

Your Commodore readers take the floor to air views, information and, of course, complaints.

Software Services

I live in Belgium and I would like to buy some of the programs on tape and disk which have been published in your magazine.

However, I don't know the prices for Belgium, Can you advise me on this and also on the form of payment?

Buchet Morc, Namur, Belgium.

Living in Australia and being an avid reader of Your Commodore. I would like to know if there is any possibility of purchasing one of the *Your Commodore* software tapes. Please could you advise me if this is possible and also let me know the costs?

Neil McKinnon, Victoria, Australia.

Our Software Service is, of course, open to all overseas readers with an extra charge of £1 sterling for overseas postage. Payment can be made using either an international money order or a cheque made out in pounds sterling. Please use the official order form published every month on the Software for Sale page.

We would also like to remind our readers that all our tapes are still available dating back to March 1986 when the service was launched.

Diskit

This letter gives me the opportunity to thank the editor for the long chat which I had with him at the last Commodore Show and to compliment *Your Commodore* on the fact that the magazine has not only maintained its high standard but gone from strength to strength. In this country, it's in a class of its own.

However, my immediate problem is that one of the articles in my copy of March 1987, is partially unreadable. The article was Diskits 1,2 and 3 and I was wondering if it would be possible to obtain a legible copy.

If I may also make a suggestion for future content of the magazine, perhaps there is scope for the occasional hardware article e.g build your own cartridge?

Thank you again and may you (and contributors), keep up the good work.

Mike Ventham, Radlett.

We apologise for the bad quality of the printing in the Diskit article. This was due to a complicated set of circumstances which wouldn't normally arise. Anyone who is very keen to use this article, should write to us at the editorial address (you will find it inside the back of the magazine) and we will send a clean set of photocopies free of charge.

With regard to hardware articles, we would be quite happy to publish this type of feature, but it is very difficult fo find someone who has the right type of knowledge and reliability. Until we find the right person, we're reluctant to experiment.

Education Crisis

Can you help me please? My children, aged five and seven, now have a C64. The problem is that we are struggling to find suitable games for them.

We are looking for educational adventure games similar to the Nursery Rhyme Land game which appeared recently in Your Commodore (February and March 87). The shops only seem to stock the most popular games and we have a few of these. But we are not yet at the stage where we can devise our own.

So I would be grateful if you could supply me with any information.

Mrs.D.A. Summers, Bristol.

As you have quite rightly realised, Mrs. Summers, educational software is very thin on the ground at the moment, however there are a few companies who deal in this market who may be able to supply you with what you need.

***Collins Soft:** 7 Grafton Street, London W1X 3LA. **Tel:** 01493 7070.*

***Longmans:** Longman House, Burnt Mull, Harlow, Essex CM20 2JE. **Tel:** 0279 26721.*

***US Gold Kids!:** Units 2/3, Holford Way, Holford, Birmingham B6 7AX. **Tel:** 021 356 3388.*

***School Software:** 69 Meadowvale, Raheen, Limerick, Eire. **Tel:** 061 27994.*

***Data Quest:** 92 Bisopswater, Wexford, Eire.*

Two Small Problems

As a C64 user, I have come up against one or two problems which I hope you can help me solve.

My Basic data converter has broken down. Is there a program which could convert my data to Basic?

I would also like to know if there are any C64 user groups and if so how can I get in contact with them?

L.V. Wigmore, Epping

We published a program which would suit your needs in the April 1987 issue of Your Commodore. The best user group to contact is ICPUG. Write to: Jack B. Cohen, Membership Secretary, 30 Brancaster Road, Newbury Park, Ilford, Essex IG2 7EP. One year's subscription is £10.

Note

At the editorial office we receive hundreds of letters from readers every month. We do try and answer each individually but sometimes this is impossible due to pressure of work. If you have written to us and not received an answer, we apologise for this but we cannot promise to reply to every piece of mail we receive. If you feel that your question or letter really needs an answer, then inclusion of an s.a.e. will guarantee a reply, although this may still take time in arriving. YC

The Professor

Novices take heart. This new package from Precision Software will introduce you gently to computing and help you conquer all your phobias.

By S. Garton

Probably many of you reading this review will say "who needs such things?". I for one found it very useful. We can't all be as bright or computerised as you lot, even you had to start somewhere. The package I am talking about is *The Professor*, a self-tutorial for the C64. It covers an introduction to Basic programming and sections on sound and graphics to show you what your C64 is capable of.

Documentation

The thing I particularly liked about *The Professor* is that you don't have to plough through reams and reams of paper to follow it as most of the instructions and explanations are included on the disk. There is a very small booklet of about 10 pages which basically tells you how to load the programs and how to experiment with the sound and graphics sections.

Starting Up

On the first side of the disk you can choose from the keyboard or Basic. Being a little stupid as far as computers are concerned I decided to start right at the beginning with the keyboard. The program explains the labelling of the keys and what each can be used for. *The Professor* is very good in that you work at your own pace, you don't have to rush and read something before it disappears.

As you work through the keyboard section you have to press different keys to continue which is good because it gets you used to handling the keyboard. This may seem very basic to some but if you haven't handled a computer before it can get you over the 'scared of touching it in case I do something wrong' syndrome.

The second section on the first side of the disk is called Basic. It goes into many things including using drives and cassettes and using different commands such as FOR and NEXT loops and PEEK and POKE. I was a little disappointed with this section as I felt that once I had completed it and fully understood it I would be a bit nearer to being able to write my own program (even if only a very small useless one). However, though the program went through all the sections carefully it didn't allow you to experiment and try the commands out for yourself.

I think you can learn and understand things a lot easier through trial and error once you have the basic information needed. There was an example given in this section for formatting a disk. It was explained what this meant and why it was necessary but the commands it used weren't explained. I felt it would have been useful to understand what 1,8 and OPEN and CLOSE meant since it would make more sense when you typed it in. Otherwise it becomes the jumble of a foreign language.

In one sense the disk is very basic, aiming at real beginners but then puts confusing or complicated statements which you were expected to understand. For instance in explaining how to validate disks you are told that this shouldn't be done on disks containing relative files but it doesn't say what these are.

Sound and Graphics

The second side of the disk covers the aspects of sound and graphics available on the C64. The first section was a bit like a music lesson. Explaining the different kinds of waveforms used by the computer.

Following this was a test to see if you had understood the sounds (you need to have quite a good musical ear to get 100%). You have an opportunity to load a sound generator example and I liked the fact that you play around with this and make your own sounds. You need the manual for this which explains how to change the oscillators and waveforms etc. for different effects. The instructions were quite difficult to start with and if you're not careful you find your eardrums being blasted with a noise that you can't stop.

Conclusion

All in all I found this package quite useful but felt the first side could have been extended a little further to give a wider knowledge of Basic programming. The second side was very good but didn't indicate how all these sounds and graphics could be used outside this disk. The disk as a whole seemed to be aiming at two different levels of computing knowledge. I think it might be useful to people who have so far only used their computers for playing games and have decided to see what else they can do with it.

Touchline
Name: *The Professor.* ***Price:*** *£11.95.* ***Machine:*** *C64+disk.* ***Supplier:*** *Precision Software, 6 Park Terrace, Worcester Park, London KT 7JZ.* ***Tel:*** *01 330 7166.*

irst section
ic lesson.
kinds of
nputer.
st to see if
unds (you
musical ear
pportunity
ample and
ay around
vn sounds.
this which
oscillators
different
were quite
you're not
ums being
you can't

kage quite
could have
r to give a
f Basic
side was
te how all
could be
disk as a
g at two
mputing
e useful to
used their
s and have
ey can do

e: £11.95.
Supplier:
Terrace,
7JZ. Tel:

DIMENSION computers l.t.d.

27/29 High Street
Leicester LE1 4FP
Tel: (0533)
517479/21874

THE MIDLAND'S LARGEST COMPUTER STORE

SOFTWARE

VIZA

Vizastar XL8 64	~~£99.95~~	£79.95
Vizastar XL8 128	~~£129.95~~	£99.95
Vizawrite Classic 128	~~£99.95~~	£79.95

PRECISION

Superscript 64	~~£60.95~~	£49.95
Superbase 64/+4	~~£90.95~~	£39.95
Superscript 64 & Superbase 64	~~£169.90~~	£79.95
Superscript 128	~~£89.95~~	£74.95
Superbase 128	~~£99.95~~	£59.95
Superscript 128 & Superbase 128	~~£189.90~~	£119.95
Superbase, The Book		£11.95

COMMODORE 128 COMPENDIUM PACK
Commodore 128 Computer, C2N Data Recorder, Music Maker Keyboard, Spirit of the Stones, Jack Attack and International Soccer Software £269.95

COMMODORE

Future Finance (Planning Package), Disc	~~£75.00~~	£17.95
Macro Assembler Development System, Disc		£14.95
Simons Basic Extension, Tape	~~£10.95~~	£12.95
Commodore 64 Programmers' Reference Guide	~~£9.95~~	£7.50

LOGO + PILOT

2 Educational Languages, Disc	~~£64.99~~	£14.95
Easyfile Database, Disc	~~£50.00~~	£17.95

AUDIOGENIC
Swift Spreadsheet 128, Disc £24.95

CBM64/128 MUSIC EXPANSION SYSTEM
Including Full Size Five Octave Keyboard, 8 Channel Synthesizer Module and Sound Studio Software
~~£149.95~~ **Few only at £99.95**

MICRO CLERK 128
Accounts Package with Spreadsheet, Database and Word Processor £99.95
Purchase Ledger £69.95
Sales Ledger £69.95
Accounts, Purchase Ledger, Sales Ledger Package now £199.95

SWIFTCALC 128
CBM 128 Spreadsheet £57.50

PRACTICORP
Inventory (Stock Control Package), Disc .... ~~£29.95~~ £14.95

6 DISC ADVENTURE GAMES PACK, 64/128
Deadline, Suspended, Starcross, Zork I, Zork II, Zork III £19.95

Pack of 12 Commodore 64 Pre-School Educational Titles, Tape £39.95

PLUS 4 COMPANIES PACK
Sales/Purchase/Nominal Ledgers with Invoicing and Stock Control £24.95

1541C DISC DRIVE £199.95
1571 DISC DRIVE £249.95
Both the above include either:
Software Pack A
6 Infocom Disc Adventure Games, or
Software Pack B
Quick Brown Fox Word Processor, Easyfile Database and Future Finance Planning Package

PERIPHERALS

MUSIC MAKER 128
Keyboard and Software, Tape £19.95

POWER CARTRIDGE
Utilities including Tape and Disc Turbo and Screen Dump £39.95

ACTION REPLAY
Tape to Disc Back-up Cartridge £24.95

64/128 PRINTER BUFFERS
32K £69.95
64K £89.95

NEOS MOUSE
WITH CHEESE SOFTWARE, Tape or Disc £27.95

THE ARTIST
Advanced Mouse Graphics Package £29.95

COMPOSER/EDITOR SOFTWARE
for Sound Expander System, Tape or Disc £24.95

TROJAN CADMASTER LIGHT PEN
Commodore 64 .... £16.95
Commodore Plus 4/C16 .... £19.95

PRINTER RIBBON OFFER
MPS 801, 802 Ribbons £5.95
MPS 803 & MPS 1000 .... £4.95
MPS 1101 M.S. Ribbons £3.50
BUY FOUR AND GET ONE FREE!

LOCKABLE DISC STORAGE BOXES
Price includes pack of 10 Commodore compatible discs
50 Capacity £19.95
100 Capacity £21.95

THE EXPERT CARTRIDGE ESM
Tape to Disc System £37.50

FREEZE FRAME 3 .... £39.95

COMMODORE MPS 803 TRACTOR FEED UNIT £24.95

FCC CENTRONICS INTERFACE
With Commodore Graphics and 8K Buffer £64.95

QUICKDISC + 1541 FAST LOAD/UTILITY CARTRIDGE £19.95

10 COMMODORE COMPATIBLE DISCS WITH FREE PLASTIC DISC HOLDER £9.95

AMIGA
System One £1050.00
System Two £1250.00
With free 1 year on-site warranty and 10 disc Software Pack including Forth, Lisp, Utilities, Text Editor, Speech Synthesis, etc.

CITIZEN 120D CBM PRINTER
High Quality Dot Matrix Printer
* Near Letter Quality Mode * 120 cps Draft Print Mode
* Friction and Tractor Feed * Needs no interface
* Full Two-Year Warranty * 100% Commodore compatible .. £199.95

COMMODORE 560P
2-colour Dot Matrix Printer takes 2¾in. roll paper £49.95

STAR NL 10C NLQ PRINTER
Fully Commodore compatible £249.95
Commodore 1571 Double-sided Drive £249.95
Commodore 1901 Colour Monitor £339.95
Philips 64/128 Green Screen Monitor £89.95
Commodore 1541C Disc Drive £189.95
Commodore 128D £499.95
Commodore MPS 1000 CBM/Centronics Printer £274.95

PERSONAL CALLERS AND EXPORT ENQUIRIES WELCOME
ALL OFFERS STRICTLY SUBJECT TO AVAILABILITY
ALL PRICES INCLUDE V.A.T.

To order, either send cheque/P.O. with coupon or ring **(0533) 517479/21874** with Access/Barclaycard number. Please allow 7 working days for delivery from receipt of order or cheque clearance.
Please add £1.00 towards carriage and packing on any software order.
Hardware orders add £1.00 under £65.00 value, and £5.00 over £65.00 value.
Printer orders add £5.00 towards carriage.

Send to: Dept. No. YC6, Dimension Computers Ltd., 27/29 High Street, Leicester LE1 4FP.
Tel: (0533) 517479/21874 Fax: (0533) 511638

VISA

Item	Quantity	Price
....		
....		
....	Total	

Name..........
Address..........
....
Telephone:..........

Blazing Paddles

Datel Electronics has recently imported this impressive illustrator package from the States. We take a look at what it can do.

By Evelyn Mills

Blazing Paddles is a really sophisticated graphics program for the C64 which is powerful, well designed and easy to use. It should be particularly noted that this program provides printer output to the Commodore 1525, MPS 801, Epson 0 and 100 Series, the Gemini 10 and Gemini 100 plus interface adaptors, while graphics may be handled with touch tablet, joystick, paddles, trackerball or light-pen. Too often one or many of these features are lacking in graphics software, but you will not be disappointed here.

Initially there is a Main Menu which is pleasantly displayed around the screen providing the following options.

Doodling

Sketching option is as the name implies and there are seven different thicknesses of line including transverse, horizontal and vertical; as well as free-hand drawing, lines and linked lines. Screen colour is changed with F1 and border colour with F3. The colour of the 'pen' is controlled by an option which pulls down a screen of the full 16 Commodore colours. To add to this there is a on/off colour mixer icon allowing for pattern filled drawing. Filling is, of course, available in either normal or pattern mode.

The BOX and OVAL options are smoothly handled (no staggers here!) either in the 'empty' state or as solid figures, should a mistake be made, the last part of the drawing entered can be removed with the space-bar. If you are totally displeased with the lot, throw it in the 'dustbin' icon and clear and screen. My only criticism is that there is no control over the speed of joystick manipulation. My lightpen, however behaves most satisfactorily with this software.

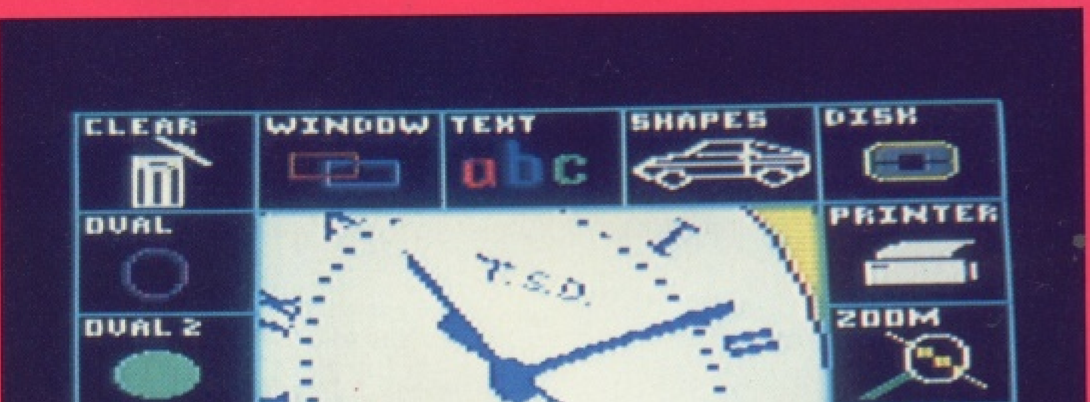
The Main Menu also has DOTTING and SPRAY features which incorporate well into your drawings – the latter is really effective. Going to the ZOOM option allows for careful, fine alterations to any part of your drawing as per usual.

The WINDOW icon presents another screen for Cutting and Pasting. If you choose cutting, select a minute part of a large area of your drawing and place it on another part of the screen (remove it with the space-bar if it's not suitable and try again). The Pasting option is very good. Here the screen may be cleared, a different drawing loaded from disk to screen, and the part you have cut out from the first drawing may then be pasted to any area on the new picture – in other words, it all stays in memory and there is no need to involve interim switching on and off of the computer. If you wish, however, windows can be saved and loaded to and from disk – as can your graphics, partly or fully completed.

Disk options

Now select the DISK option from the Main Menu to give the DISK UTILITY MENU. Here are the facilities for saving and loading to disk, plus a disk catalogue and a disk management system. If you select the latter, disk formatting, erasure and renaming are available. There are also two other features on the Utility Menu.

If you choose the Load Shape



Mini Office II



WORD PROCESSOR
Compose a letter, set the print-out options using embedded commands or menus, use the mail merge facility to produce personalised circulars – and more!

SPREADSHEET
Prepare budgets or tables, total columns or rows with ease, copy formulae absolutely or relatively, view in either 40 or 80 column modes, recalculate automatically – and more!

GRAPHICS
Enter data directly or load data from the spreadsheet, produce pie charts, display bar charts side by side or stacked, overlay line graphs – and more!

DATABASE
Build up a versatile card index, use the flexible print-out routine, do powerful multi-field sorting, perform all arithmetic functions, link with the word processor – and more!

COMMS MODULE
Using a modem you can access services such as MicroLink and book rail or theatre tickets, send electronic mail, telex and telemessages in a flash – and more!

LABEL PRINTER
Design the layout of a label with the easy-to-use editor, select label size and sheet format, read in database files, print out in any quantity – and more!

DATABASE SOFTWARE Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY

ORDER FORM

Please send me Mini Office II for the Commodore 64/128

☐ £16.95 cassette
☐ £19.95 5¼" disc

I enclose cheque made payable to Database Software, or debit my Access/Visa card:

☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Exp. date ☐

Signed ....

Name ....

Address ....

....

....

ORDER HOTLINE: TEL: 061-480 0171

SEND TO: Database Software, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

YCM6

Table option, you have access to 'inbuilt' drawings for you to add to your graphics if you so wish. These are classified as miscellaneous, plants, transport, face parts, animals and weapons. There is quite an arsenal in the whole lot varying from trees to ears, to kangaroos to 'planes, trucks boats and things. Select your option, go back to the Main Menu then to the Shape icon and rummage through the lot. The drawings can be flapped and rotated and placed on screen in any position. It should be emphasised that these are not sprites but drawings and will therefore output to the printer.

The Load Character set option, provides four styles of print for captions: standard, bold, script and italic. Having made your selection, off to the Main Menu, select the ABC icon and scribe away using the keyboard lettering in both upper and lower case.

The Printer icon leads to selective printer output which is self explanatory.

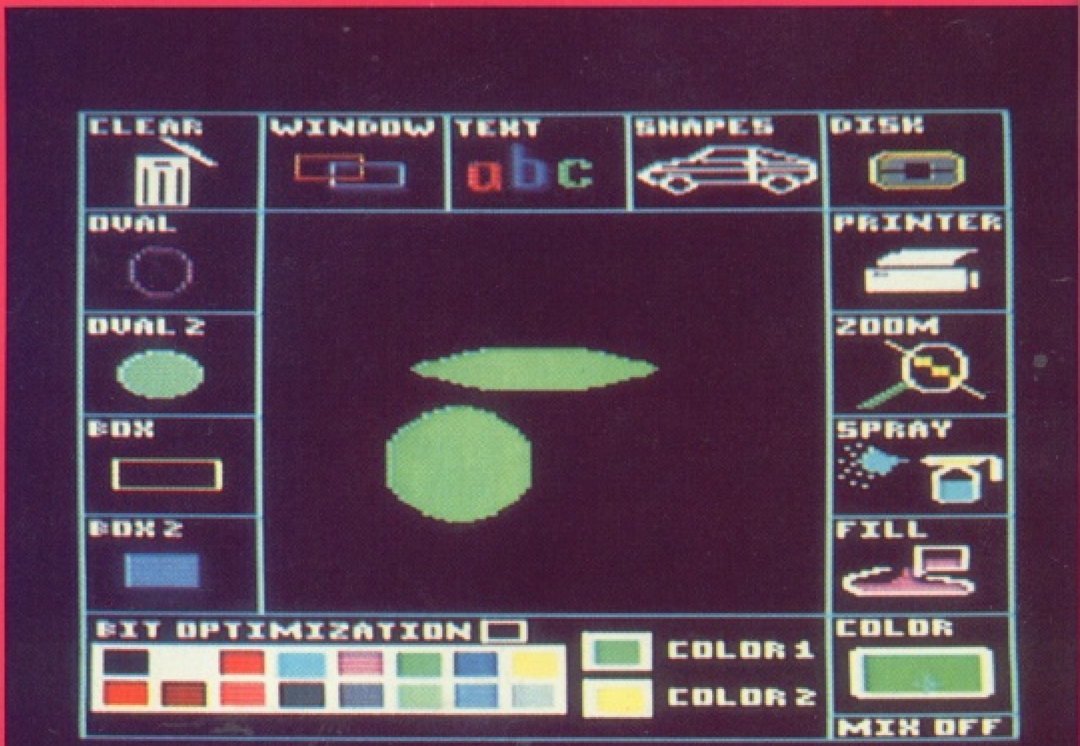
To Sum Up

Quite apart from the inbuilt drawings, you have here a very professional tool for your money (£24.99). Everything works well, with the minimum of fuss and little chance of crashing. With patience and care a great deal can be achieved graphically; the programmers have done a good job so the rest is up to you! Incidentally, try loading a picture if you want a look-see at the authors. There is also a world map there.

Fundamentally you pay for what you get and, in my opinion, Blazing Paddles is worth the price.



Touchline
Name: *Blazing paddles.*
Supplier: *Datel Electronics, Units 8/9, Fenton Industrial Estate, Dewsbury Road, Fenton, Stoke-on-Trent.* ***Tel:*** *0782 273815.* ***Price:*** *£24.99 post free. State Tape or disk including free light pen.*



Accelerator +

Want a drive for your Commodore computer? Can't afford a 1541? perhaps the Accelerator + is for you.

By Stuart Cooke

One of the many gripes that people have about Commodore equipment is the fact that, without complicated interfacing, only other Commodore product s work with it. In the USA a number of manufacturers have made the most out of this by producing a Commodore compatible products, new disk drives being one of the most popular. Now Evesham has introduced an alternative Commodore compatible drive on to the UK market.

Good Looks

It is extremely difficult to comment on a disk drive since it simply works or it doesn't. *Accelerator* + works and it works extremely well offering a number of advantages over its Commodore counterparts.

The size of the drive is roughly half that of the drives from Commodore. This has been achieved by placing the power supply outside the disk drive casing, just like your computer's powerpack. This is great for people who require a two drive system since two drives no longer take up your work desk, they can sit neatly on top of each other taking up less room than a single Commodore drive.

Snail Pace?

Commodore disk drives are so slow when compared to many other computers and drives on sale that a number of manufacturers have produced add-ons to speed up operation of the drives, Dolphin Dos again from Evesham being extremely popular, a speed increase of 25% is claimed for the *Accelerator* +. This may not seem like a great amount at first but, when you are loading large files, a 25% increase in speed is worth having. To be fair to the Commodore drives, I did find the increase in speed to be of notice only on large files, on smaller ones you simply don't notice the difference.

Compatibility

One of the major problems with Commodore disk drives is one of compatibility. Many programs are using forms of protection that will only work on the 1541 drive and will not work on either the 1570 or 1571 drives that are available. Best known offender is Elite from Firebird. It is impossible to LOAD this on anything apart from a 1541. With the Accelerator + Elite was the only program that I could find that wouldn't LOAD. This isn't bad when it doesn't even work on all Commodore's drives.

Commands Available

All of the commands that you can use on the Commodore range of drives are present. The detailed manual explains them all for those of you that have never used a disk drive before. Because all the standard commands are available I found that all the disk-orientated utility programs that I have, such as a disk monitor, all work without any problems at all.

What Device

If you have ever used more than one Commodore drive together you probably know how difficult it is to change the device number on one. Two options are available to you, you can either choose the software option of altering the number of the drive through a number of commands every time that you turn your drive on, or you can unscrew your case and cut a track on the circuit board making the alteration permanent. With *Accelerator* + things are much easier. Turning the drive over reveals two small switches. To change the device number of the drive simply move the switches to the relevant position and you've done it.

In Use

Using the drive presents no problems. The drive appears to be much quieter than the 1541 drive in operation which will please people who are fed up with the sound of their 1541 disk head moving around.

I could only find one real fault with the drive, and to be honest the fault was caused by my error. If you have ever used a Commodore drive then you will no doubt know that on many models the disk is pushed out of the drive when you open the drive door. With the *Accelerator* + this is not the case. If, like me, you have the drive below the level of the computer this makes it difficult to see if a disk is in the drive. On a couple of occasions I found that I couldn't use a disk only to find the reason this was caused was because there was already one in the drive.

Verdict

The *Accelerator* + is an excellent product. The fact that it takes up a lot less space than a Commodore drive and that it is almost completely compatible with the 1541 would win me over to it even without the advantage of the speed increase.

To quote Evesham: "Why buy a lumbering hippo (1541) when you can buy an *Accelerator* + for forty pounds less!" Why indeed?

Touchline
Name: *Accelerator +.* ***Supplier:*** *Evesham Micros, 63 Bridge Street, Evesham, Worcs WR11 4SF.* ***Tel:*** *0386 41989.* ***Price:*** *£159.95.*

Evesham Micros

ALL PRICES INCLUDE VAT & DELIVERY

THE star NL-10

PRINTERS FOR BUSINESS

WHICH MAGAZINE BEST BUY



- Automatic single sheet handling
- Tractor feed built in
- "Front Panel" mode selection
- Double and Quad height characters
- 120 cps draft and 30 cps NLQ

This is the best Commodore ready printer you can buy. Combines many unique features with **superb reliability, styling and print quality.** But the real beauty is that the interface cartridge is interchangeable so if you change comp-uters just buy a new interface.

In a group test with other popular printers such as Epson, Citizen and OKI *What Micro* magazine described the NL10 as **'the Rolls Royce of this group'.** ONLY **£249.00**

Automatic cut sheet feeder available as an option for **£63.25**

SELECTED PRODUCTS

SEIKOSHA SP 180VC

A new Commodore ready printer that offers both friction and tractor feed combined with NLQ ability. Print speed is 100cps in draft and 16cps in NLQ.

ONLY **£189.95**

1541C DRIVE. The latest version of the 1541, better drive mechanism and new colour ONLY	£189.95
DISC NOTCHER. Double the capacity of your discs with this handy gadget. Cuts second write protect notch accurately and easily ONLY	£5.95
AZIMATE 3000. Handy package allows you to easily check and realign the tape head of your CBM data recorder. Includes screwdriver ONLY	£6.95
MOTHERBOARD. 4-slot, with either all upright sockets, or three upright and one through socket, to suit modem; please specify ONLY	£28.00
POWER PACK. High quality replacement power pack for CBM 64 ONLY	£24.95
XETEC SUPERGRAPHIX. The best centronics printer interface for your 64/128. Large buffer, downloadable fonts, etc. ONLY	£69.00
DATA RECORDER. CBM compatible, same performance as the C2N/1531 but cheaper and includes a pause button. ONLY	£24.95

Large stocks of Commodore-related equipment at sensible prices. If you don't see what you want, give us a call.

DISKS AND BOXES

25 bulk-packed DS/DD disks with w/p tabs and labels ONLY	£13.95
25 disks as aove with 50 capacity lockable box ONLY	£22.95
25 disks as above with 100 capacity lockable box ONLY	£24.95
50 capacity lockable box ONLY	£10.95
100 capacity lockable box ONLY	£13.95

THE EXCELERATOR+



ULTRA COMPATIBLE

For COMMODORE Computers

Why buy a 1541C when you can buy this neat, reliable and compact drive for less money?

FEATURES

- Handles Disc Turbos
- Direct Drive Motor
- 1 Year Guarantee
- Ultra Compatible
- External 8/9 Switch
- Very Reliable
- Compact Size
- Very Quiet
- Doesn't Overheat
- 20% Faster

Tests have shown the Excelerator to be **more compatible** with protected software than the CBM 1541C. We can't find **any software** that it will not load.

TWO PURCHASE OPTIONS —

DON'T BUY A LUMBERING HIPPO (1541C)!

THE EXCELERATOR+ OFFERS MORE FOR LESS MONEY

SPECIAL INTRODUCTORY PRICE ONLY £159.95

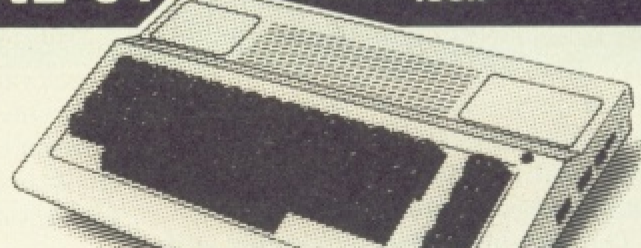
COMBINATION OFFER EXCELERATOR+ and FREEZE FRAME Mk IV ONLY £179.95

THE SLIMLINE '64

Give your '64 the modern look

A NEW IMAGE FOR THAT FAVOURITE COMPUTER

- Easy to Fit
- Lower key height



This modern case with it's sleek style will transform your '64. The high quality injection mould is superbly finished in the latest ivory colour. The lower key height is also a boon to operator comfort.

Fitting is very simple, requiring just a Philips screwdriver, and can be completed in less than 10 minutes. Stock now available so order for quick delivery.

Only £19.95

DOLPHIN DOS



YOU WON'T BELIEVE YOUR EYES!

THE EFFECT IS *STAGGERING.*

Now established as **THE parallel operating system** for the 1541 disc drive. Hundreds of satisfied users include business, hobby, full-time programmers, and **many leading software houses, including Gremlin Graphics, Domark, Superior, Alligata, Thalamus, Adventure International, and Software Projects.**

The speed and efficiency is truly unbelievable, it is compatible with **the vast majority of commercial software,** speeding up both the loading of the program **and of SEQ/REL files.** (It is brilliant with Superbase, Easyscript, etc.) For non-compatible programs it can be **completely switched out.** It DOES NOT use a special disc format and your existing discs will be compatible.

FITTING

Fitting involves the insertion of two sub assembly circuit boards, one in the 1541 and one in the '64/'128. These normally just plug in but on some '64s a small amount of soldering is necessary.

SOME OF THE FEATURES

- 25x FASTER LOADING (PRG FILES)
- 12x FASTER SAVING (PRG FILES)
- 10x FASTER LOADING (SEQ FILES)
- 8x FASTER SAVING (SEQ FILES)
- 3x FASTER LOAD/SAVE (REL FILES)
- E.G. LOAD 202 BLOCKS IN 5 SECS
- EASY AND FAST DOS COMMANDS
- USE 40 TRACKS FOR 749 BLOCKS
- MONITOR BUILT IN
- DRIVES CENTRONICS PRINTER
- ENHANCED SCREEN EDITOR
- EXTRA BASIC COMMANDS

(These figures do not allow for searching)



Best Hardware Utility of year

EXTRAS AVAILABLE . . .

Kernal for '128 in '128 mode	£9.95
User port expansion card (3 slot)	£14.95
Dolphin Copy (Whole disc in 18 secs and lightning fast file copier)	£7.95
Dolphin main board for second drive c/w lead	£44.95

If you require further information, please send SAE for fact sheet

Only £69.95 Available for CBM 64, or '128 in '64 mode, please specify.

In Australia: contact **Micro Accessories of S.A.,** Unit 8, Hewittson Road, Elizabeth West, S. Australia 5113. Tel: (08) 287-0191

THE CHOICE IS YOURS!



BACKUP CARTRIDGES

THE FACTS

Almost eighteen months ago, Freeze Frame Mk I revolutionised backup methods. Since then many imitators have appeared on the market. Some of the claims being made for certain of these products are rather misleading. Let us inform you of some positive facts.

1. **Much of the new software released uses "Anti-Freeze"; only Freeze Frame and one other product can handle these.**
2. **Only Freeze Frame can automatically handle these and other programs. You don't need to be an "Expert" or need "O" levels to operate Freeze Frame.**
3. **At press date (11.2.87) our exhaustive tests were unable to find any memory resident program that both Freeze Frame Mk IV and Lazer were unable to back up, completely automatically.**
4. **Similar tests with all rival products proved disastrous.**

THESE ARE THE FACTS
(not outrageous advertising claims)

FREEZE FRAME Mk IV

NEW PRICE . . . WHY SETTLE FOR LESS!

Now you can buy a **pedigree Freeze Frame** backup cartridge for a startling new price. **No need to settle for less,** this is the latest development of the originator. **More power, more features, easier to use.**

POWER

Legendary amongst Commodore owners but with continual development now even more impressive.

FEATURES

Three cartridges in one . . . fast load, utilities and backup.

TAPE to DISC — **TAPE to TAPE**
DISC to DISC — **DISC to TAPE**

So simple to use, just plug in and switch on, at the menu choose your option, no messing with software, it's always ready.

Load the program that you wish to backup, press the button on Freeze Frame, then you can either:

1. **Press "D" to save to disc with fast reload.**
2. **Press "S" to save to disc with standard reload.**
3. **Press "T" to save to tape with fast reload.**

MULTI STAGE PROGRAMS

The standard cartridge will transfer to disc **many tape based multi stage programs, e.g. Summer Games II, Silent Service, Winter Games, etc.** and when used in conjunction with the regularly updated **"F.F. Utility Disc"** the **vast majority** of programs of this type can be handled.

MORE FEATURES

- **Doubles as a fast load cartridge**
- **Loads extra parts fast**
- **Built-in Fast Format**
- **Built-in File Copier (up to 248 blocks)**
- **New "SELECTALOAD" feature (Press "L" for directory, select with cursors, then press F3 to load.**
- **Undetectable by software**
- **Files compressed for disc economy**
- **128/128D compatible in '64 mode**

PROGRAM RELOAD IS INDEPENDENT OF CARTRIDGE

NOW ONLY **£28.95**

At this price there is no need to settle for less

UPGRADES: Mk I or II . . . £14.95
Mk III or IIIB . . . £9.95
Mk IV to LAZER . . . £11.95

FREEZE FRAME LAZER

ANOTHER TRENDSETTER?

From the design team that changed the face of backup technology comes **another innovation.** The powers of Freeze Frame have been combined with a **staggeringly quick** new loading system. An **amazing 32K of ROM** provides you with **all the facilities of Freeze Frame Mk IV** as described opposite, plus the stunning new **LAZER** loading technique.

Check these LAZER features:

- **Reload a program in 10-15 seconds**
- **Save a program in 10-20 seconds**
- **Loads extra parts at VERY HIGH speed**
- **Load speed approx. 20× normal**
- **Save speed approx. 20× normal**
- **Includes RESET**

Cartridge must be present to reload at LAZER speed
Proven power with stunning new technology:

ONLY **£39.95**

UPGRADES: Mk I or II . . . £29.95
Mk III or IIIB . . . £19.95
Mk IV . . . £11.95

"F.F." UTILITY DISC V2.0

Now with **many more** routines to allow the complete transfer from tape to disc of programs that load parts as the program progresses. Used **in conjunction with Freeze Frame** for the awkward ones that cannot be handled by the standard cartridge. Included are routines for most popular games like **Supercycle, World Games, Gauntlet, Trivial Pursuit, Ace of Aces, Dragons Lair I & II (includes training mode), etc., etc.**

ONLY **£7.95**

Update fee for owners of **V1.0** is **£2.00**

DISC DISECTOR V5.0

The fifth version of the country's **leading** disc backup/utility program. This latest version includes **many "PARAMETERS"** to handle the latest highly protected discs. This includes the latest **American and English software.** Be warned if you want to back up software by Ocean, Gremlin, Hewson, Domark, and even U.S., Gold whose protection schemes are NOT always the same as the American versions, then you **MUST have "D.D.".** At press date, **we are sure NO other advertised product will handle all these, be it American or German.**

INCLUDES THE FOLLOWING

- **EVESHAM 3 MINUTE NIBBLER**
- **EVESHAM 8 MINUTE NIBBLER**
- **MANY PARAMETERS** (The vital code for the protection schemes)
- **DUAL DRIVE NIBBLER**
- **MENU MAKER (with select facility)**
- **DISC ORDERLY**
- **FAST FORMAT**
- **FAST FILE COPY**
- **UNSCRATCH**
- **DISC RESCUE**
- **DISCMON+**
- **ETC., ETC., ETC.**

The whole package is menu driven and has its own fast boot system built in for your convenience. Pays for itself the first day you receive it.

ONLY **£24.95**

Customers with earlier versions may return them along with a payment of **£7.95** to receive **V5.0.**
Most routines are CBM 128 and 1570/71 compatible in '64 mode.

QUICKDISC+

Our highly popular fast load and save plus utility cartridge has received many favourable reviews.

- **FAST LOAD (5 to 7 times improvement)**
- **FAST SAVE (5 to 7 times improvement)**
- **FAST FORMAT (20 seconds)**
- **FAST BACKUP (4 minutes)**
- **FAST FILE COPY (up to 248 blocks)**
- **EASY DOS COMMANDS**
- **CENTRONICS PRINTER DRIVER**
- **RESET BUTTON (unstoppable)**
- **HELPS MENU**
- **USES NO MEMORY**
- **'128 COMPATIBLE ('64 mode)**

Exception value for money at only . . .

£19.95

1541 QUIET STOPS

Cure for ever the dreaded 1541 drive head "hammering".

- **Easy to fit**
- **Detailed instructions**
- **One kit does two drives**
- **Helps prevent misalignment**

ONLY **£4.95**

Not suitable for "turn lever" type drives.

DOUBLER

THE tape backup "device"

Many thousands of this popular product have been sold and sales continue to flourish. Why? We think because it is the best product of it's type. Consisting of hardware and software it uses a unique method controlled by the software that allows you to produce perfect backups of your tape software.

It is very easy to use and very successful, in fact our tests have proved that Doubler can achieve 100% success.

ONLY **£12.95**

1541 PHYSICAL EXAM

Have you got . . .

Alignment problems

If so, you need this package. Contains digital alignment disc and drive fault diagnosis software that allows you to check **and correct** head alignment.

- **CHECKS RADIAL ALIGNMENT**
- **CHECKS SPEED**
- **CHECKS BELT AND CLAMPING**
- **THOROUGH INSTRUCTIONS**
- **INCLUDES QUIET STOPS**

ONLY **£39.95**

ORDERING INFORMATION

ALL PRICES INCLUDE VAT AND FREE DELIVERY WITHIN U.K. (Despatch within 24 hours whenever possible)

HOW TO ORDER

By Post
Send cheque, P.O., or ACCESS/VISA details to our Evesham address

By Phone
Call our Evesham branch and quote your ACCESS/VISA details

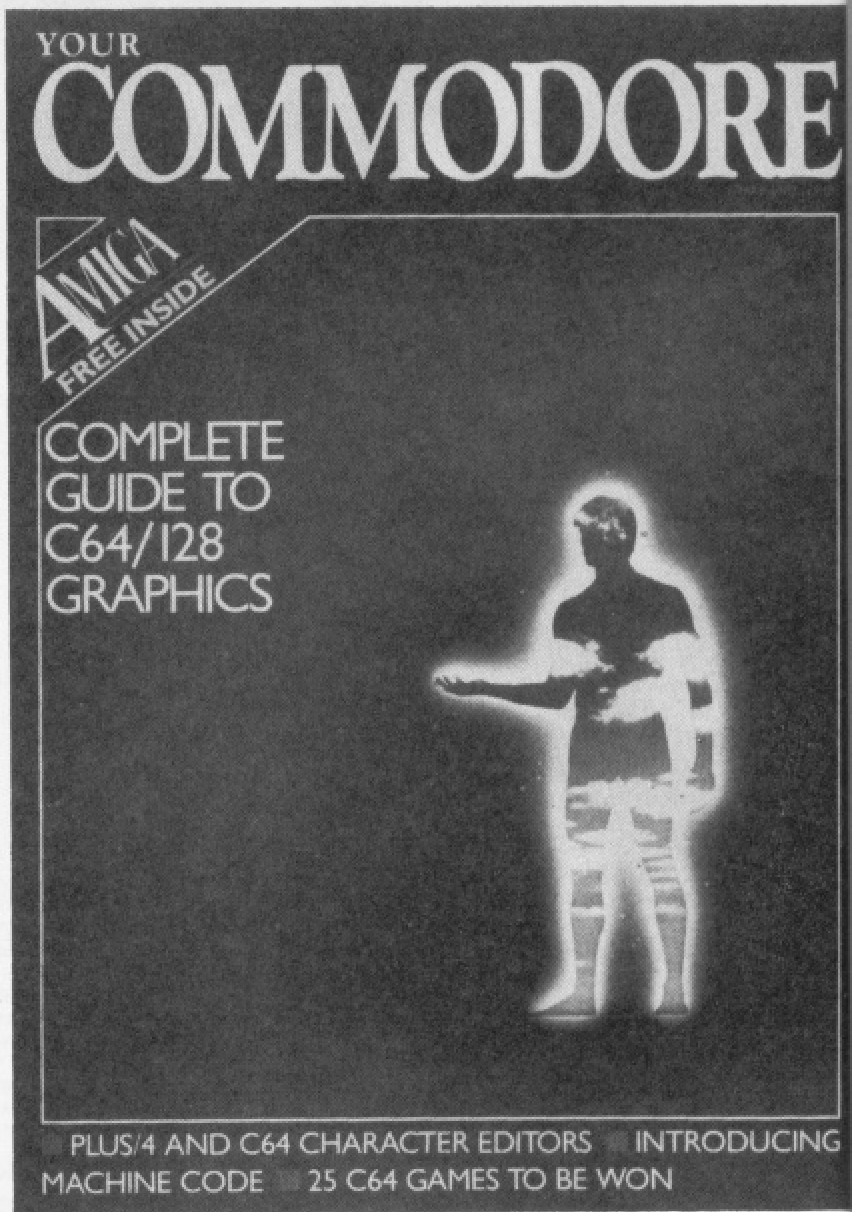
EVESHAM MICROS, 63 BRIDGE ST, EVESHAM, WORCS. WR11 4SF

CALLERS WELCOME **Tel: 0386 41989 Telex: 333294** **TRADE ENQUIRIES WELCOME**

Also at: 1756 Pershore Road, Cotteridge, Birmingham B30 3BH. Tel: 021 458 4564

All items subject to availability, E.&O.E. Orders from Government and Educational departments welcome.
Overseas Orders: Within Europe, please send advertised price. Outside Europe, add **£2.00** for Air Mail

OUT ON ITS OWN AND RISING FAST!



YOUR COMMODORE has no competitors —no competitors that is, that cater for the serious and committed user, every issue—and it shows, for they have voted with their pockets!

Your Commodore's latest audited circulation of 43,979 reflects a 12.3% increase over last year. That means we now deliver in excess of 76,000 readers every month, and they are the readers who spend £6.8 million on Software and £8.2 million on Hardware annually.

It's a market you can't afford to ignore and one that's growing with the addition of 'Your Amiga' supplement every other month.

Your Commodore is the only magazine with an audited circulation reaching the growing market of serious Amiga users in the UK and Europe.

It's a tremendous package and a market you can't miss out on!

To be there, contact Peter Chandler, Senior Advertisement Manager, on 01-437 0626 ext. 296—NOW!

Games Reviews

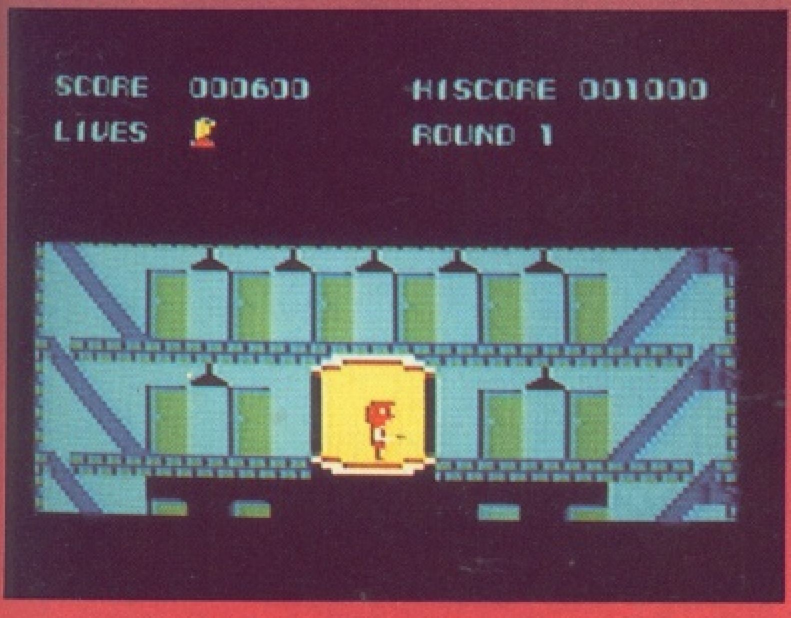
Arcade games galore will keep you entertained. Take your pick from these pages.

ELEVATOR ACTION

At long last, your search is over. You have found the secret hideout of the gang. All that remains for you to do now is search the building, discover all the secret plans and make good your escape. What could be easier?

Elevator Action is a conversion of the Arcade game from Taito. Starting at the top of the building, you must use the lifts and stairs to take you to the various floors. Doors containing part of the plans conveniently flash, indicating their whereabouts and these must be searched.

Intent on hindering your progress are a multitude of gangsters who appear out of the other rooms, shooting as they go. Fortunately, the bullets travel slowly enough for you to leap. You can of course fire back or, if you are close enough, deliver a deadly karate kick. It is also possible to shoot out the lights thus throwing everything into a state of confusion. When you have obtained all the plans, make your way to the bottom of the building where your getaway car is waiting.



The getaway is soemthing of a misnomer though as you only travel to the roof of the next building where the baddies are correspondingly tougher.

The gameplay in Elevator Action is at best tedious, the graphics are crude and there are several bugs – the game crashes, your man keeps flying off the top of the screen etc. What more can I say apart from don't waste your money.

G.R.H

Touchline
Title: *Elevator Action.* ***Machine:*** *C64.* ***Supplier:*** *Quicksilva, Victory House, Leicester Place, London WC2H 7NB.* ***Tel:*** *01 439 0666.*

Originality: *4/10.* ***Graphics:*** *4/10.* ***Playability:*** *3/10.* ***Value:*** *2/10.*

SAILING

Now that the Americas Cup has been won by America (again) you'd think that we could go back to ignoring sailing. No chance! Once the software houses have discovered a new sport we're going to get swamped in games. Luckily, Activision's Sailing doesn't assume you're part of the plimsole and hat brigade and is an arcade players guide to sailing.

The game casts you as the challenger representing one of 18 countries in a ladder competition. You begin at the bottom of the ladder and by racing, and beating, yachts up to two places higher than you, you hope to climb the ladder to glory.

You're supposed to make decisions about your boat design and define factors such as the boat length, waterline length, mast height and keel design but I found that trial and error worked quite well and after the latest weather forecast I was ready for the first race.

During the races a split screen display shows a 3D view



ahead (including your opponent if he's ahead of you) and also your bank of instruments, including a wind direction marker and a radar that plots your progress around the course.

Winning a race not only depends on the design of your boat but also when you use your giant spinaker sail and the direction you sail in. Since the course is triangular you will have to sail both into the wind and with it, so you have to be careful when to use the sail (speeds you up when the wind is behind you) and to keep on course.

The result is a highly playable sailing game that allows you to compete alongside million dollar yachts for only £9.95. **T.H.**

Touchline
Title: *Sailing.* ***Supplier:*** *Activision, 23 Pond Street, London NW3 2PN.* ***Tel:*** *01 431 1101.*
Machine: *C64.* ***Price:*** *£9.95 (cass) £14.94 (disk).*
Originality: *6/10.* ***Playability:*** *7/10.* ***Graphics:*** *7/10.* ***Value:*** *7/10.*

ARKANOID

In an unknown time, the mothership Arkanoid was destroyed. There were no survivors apart from yourself who managed to escape in the spacecraft Vaus. Not to complete safety though as you become trapped in the void. If you can penetrate 32 levels though and overcome a final confrontation with the Dimension Changer, time itself will be reversed and Arkanoid will be resurrected.

Right, hands up all of you who guessed from the opening paragraph that the game being described was none other than that old favourite, Breakout. OK, so this version is somewhat more sophisticated than the original but the game remains the same.

Converted from the arcade game of the same na,e the object is to bounce a ball into a brick wall, thus knocking bricks out of it. When the last brick vanishes, you progress on to the next level. Of course, it's not quite that easy. Some of the bricks have to be hit several times before they finally yield. This is especially difficult on the higher levels with five hits per brick being required. Some bricks are totally indestructable and are just there to futher hinder you. As too are the monsters that materialise. These have no function in the game save that they deflect the ball from its original path.

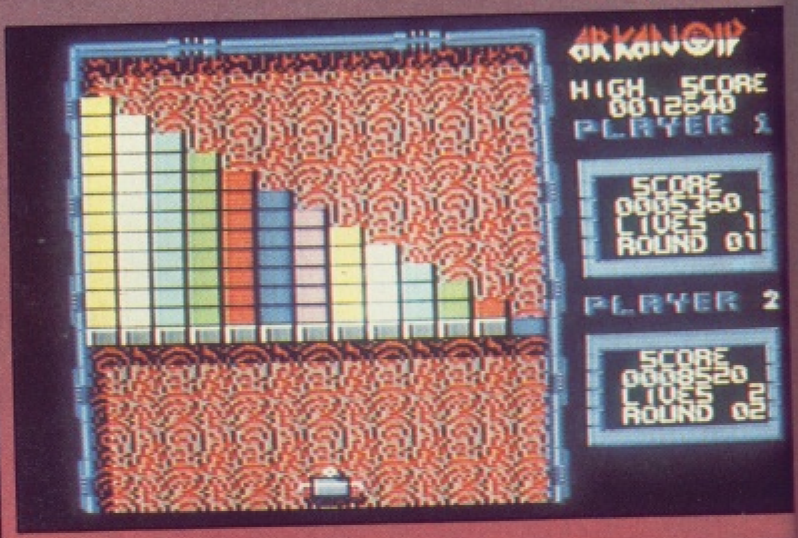
So much for the bad news. Not everything is against yo however. Hiit certain bricks and capsules are release towards you. Catch one of these on your bat and you ga the benefit for as long as you keep the ball in play or until yo capture another capsule. There are three main types bonus.

Those that help you hit and aim the ball – extended ba length, slowing down of the ball and catching the ball on th bat. Those that help you destroy the bricks – a laser and th ball splitting into three and finally, the long term benefits an extra life and a passage through to the next level.

The graphics are reasonable if not startling and for tho of you whom ability prevents from getting very far, there is bug that you might find useful. On our review copy, w found that when player two got his first bonus life at 20,00 points, we went into an infinite life mode.

This game is direct competition with Krakout fro Gremlin and the office was split down the middle as to whic it preferred. Krakout offers more player options and furth sixty-eight screens. Arkanoid is mroe difficult. Personally, prefer Krakout but our illustrious editor has somewha diametrically opposite views. You pays your money and yo takes your choice. **G.R.**

Touchline
Title: *Arkanoid.* ***Machine:*** *C64.* ***Supplier:*** *Imagine, Units 2/ Holford Way, Holford, Birmingham B6 7AX.* ***Tel:*** *021 35 3388.*
Originality: *4/10.* ***Graphics:*** *6/10.* ***Playability:*** *7/10.* ***Valu*** *7/10.*

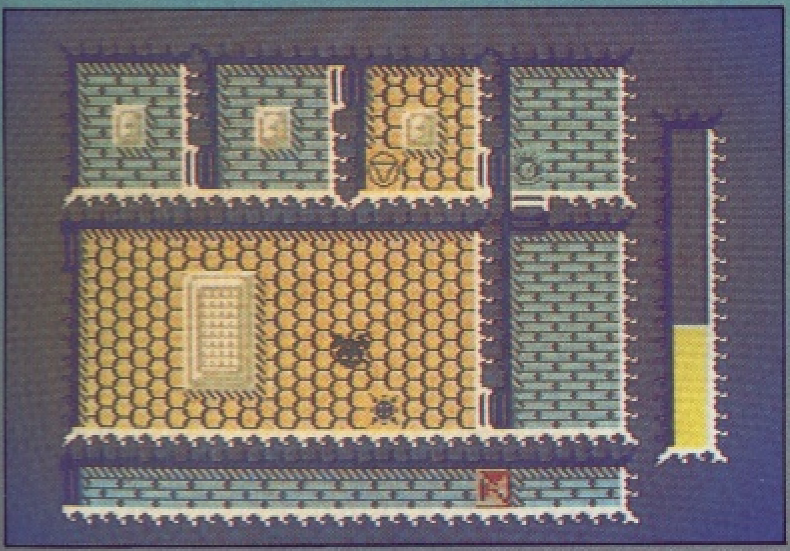


RANARAMA

Mervyn the Sorcerer's Apprentice was attempting concoct a spell to improve his looks and turned himself int a frog! Now evil Warlocks have him trapped in a dungeo but at least he's still alive. Your job in Steve Turner's fir C64 game is to defeat the Warlocks and restore yourself humanity.

You begin the game in a room on the first level of th dungeon with eight Warlocks to track down. These a guarded by evil critters such as dwarves, fire gollums, ghou and serpents that attack you on sight. Unfortunately, you g

You begin the game with the lowest spells in each of th you find a door to enter into them. Even if you've alread been in them their contents remain cloaked until too late



As well as the nasties the rooms also contain Gauntlet style generators that produce munching mouths, spinning knives and orbiters to sap your strength and mysterious glyphs set into the floor. Each glyph has a specific use to help you through the game and so should be used sparingly. The glyph of seeing displays a map of the level (only the rooms you've already explored), the glyph of power wipes out some of the critters in the room, travel leads you down to the other levels and Sorcery is used to improve your spells.

You begin the game with the lowest spells in each of offensive, defensive, power (energy) and effect which is used to find secret doors. As you collect runes by defeating the Warlocks in magical combat you can get bigger and better spells to allow you to delve deeper into the dungeons.

The magical combat is a subgame that you play once you've cornered a Warlock (they can usually be spotted fleeing from the room) and consists of unjumbling an anagram of the word Ranarama by swapping pairs of letters. Complete it in the time limit and you can collect up to eight runes, lose and you lose the game.

Steve Turner is better known for his excellent Spectrum games as you'll find out once you play Ranarama as it looks and plays like a top Spectrum game. However it doesn't make use of the C64's superior sprite, and colour facilities which would have made an excellent game even better.

T.H.

Touchline
Title: *Ranarama.* ***Supplier:*** *Hewson, 56B Milton Trading Estate, Milton, Abingdon, Oxon OX14 4RX.* ***Machine:*** *C64.* ***Originality:****9/10.* ***Playability:*** *7/10.* ***Graphics:*** *3/10.* ***Value:*** *7/10.*

AFTERMATH

Looking like a coin-op conversion the Aftermath is the desperate struggle for survival following the victory by the Saurans. Now there seems to be little hope of survival unless you can fight through to the Strategic Command Centre past the dreaded discs of death and the impenetrable Veloscraft. Others have tried and failed you must succeed.

The object of the game is to fight your way through to the base by surviving 10 waves of aliens that attack in different ways. These can be shot with your laser bolts and you can also earn extra points by bombing buildings. These are destroyed by lining up the sight that constantly travels in front of you with the target and pulling back on the joystick. Unfortunately, moving the ship to line up the sight on a target can move you into the path of an enemy miissile that you thought was safely behind you.

The first aliens to strike are rotating discs that are then followed by space ships that move slowly down the screen destroying all in their path then the same ships appear, moving at an angle designed to catch the unwary gamer.

In later levels the bombing practice becomes essential as some of the buildings now fire at you as well!

A cheap and cheerful arcade game to fill in those odd moments between more challenging games.

T.H.

Touchline
Title: *Aftermath.* ***Supplier:*** *The Power House, CRL House, 9 King's Yard, Carpenters Road, London E15 2HD.* ***Tel:*** *01 985 6877.* ***Machine:*** *C64.* ***Price:*** *£1.99.*
Originality: *4/10.* ***Playability:*** *7/10.* ***Graphics:*** *5/10.* ***Value:*** *7/10.*



STRANGELOOP

The aliens are threatening Earth again, this time by taking over the major robot making factory and reprogramming the robots to form deadly weapons to destroy mankind. As usual you are Earth's last chance.

If it sounds like an old plot you'd be right because it's a budget rerelease of Virgin's first arcade adventure.

Your mission is to battle your way through 250 rooms to the control room. However, on the way, you will have to ensure you have sufficient oxygen supplies and keep your space suit patched up despite the almost constant bombardment of sharp swarf. These you can blast with your laser but your laser rifle has only 99 charges.

You can move from screen to screen either through the hatches at either side of the screen or by sliding up and down tubes that seem to lead everywhere but where you want to go.

A map at the bottom of the screen leads you to the control room but also into megaswarf areas so you need to know where extra oxygen cylinders, first aid kits and patches are stored.

To add to your problems you will also have to look out for pools of acid, conveyor belts, that carry you to your doom, and heavy traps poised to plummet as soon as you reach for the first aid box.



If you missed this one the first time round and enjoy 250 screen arcade adventures then snap up this budget game for your collection. T.H.C

Touchline
Title: *Strangeloop.* ***Supplier:*** *Bug-Byte, Victory House, Leicester Place, London WC2H 7NB.* ***Tel:*** *439 0666.* ***Machine:*** **C64.** ***Price:*** *£2.99*
Originality: *4/10.* ***Playability:*** *6/10.* ***Graphics:*** *5/10.* ***Value:*** *5/10.*

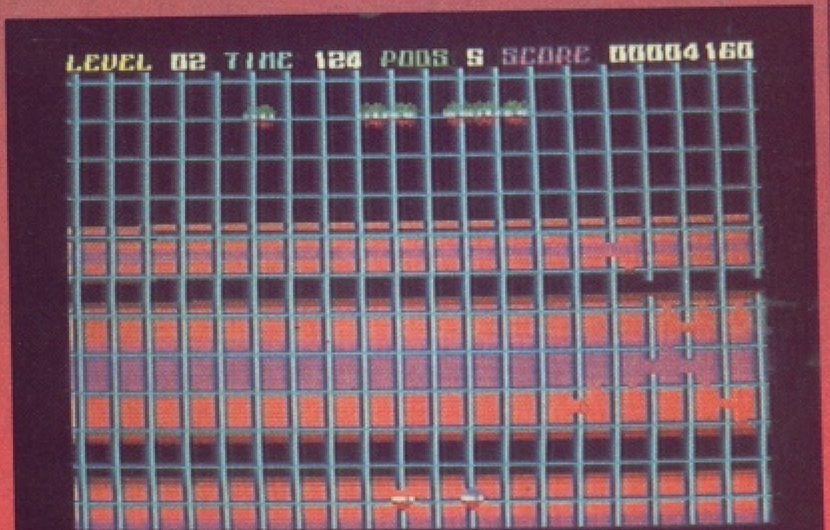
POD

There's no plot or pseudo science fiction storyline in Pod it's just an incredibly addictive all action arcade shoot-em-up.

You are the pod that must patrol a grid against alien attack by blasting them with your laser in a game that's a cross between Minter's Gridrunner and coin-op's Centipede and Galaxians.

Everytime you zap an alient it explodes destroying part of the grid. And since you can only move along the fibres of a grid you can easily blast your way into trouble! Similarly if they get you, the resulting explosion takes out half the grid. Luckily it rebuilds itself so you might be able to hang on till the end of the attack wave.

You don't have to kill everything just survive for the time limit that counts down at the top of the screen. Survive and you'll win a bonus and an extra life to challenge the next level.



Bonus levels appear every fourth screen so you can pil on the points.

In later levels the alien fire is heavier the more you fire a them and in some they set out to hunt you down. For these you'll probably need the maximum five lives.

A fun, cheap, addictive arcade game. What more do yo want! T.H

Touchline
Title: *Pod.* ***Supplier:*** *Mastertronic, 8-10 Paul St. Londo EC2A 4JH.* ***Tel:*** *01 377 6880.* ***Machine:*** *C64.* ***Price:*** *£1.99.* ***Originality:*** *3/10.* ***Playability:*** *10/10.* ***Graphics:*** *4/10.* ***Value*** *8/10.*

THE EQUALIZER

Solve and evolve is the name of the game in this fu arcade game.

You begin the game in nappies standing in the middle o a wood until you are set upon by green catapillars and gian red and white snails!



By timing your leaps and shooting what can only b described as goo that comes from just above the nappy yo should be able to battle across the scrolling screen and eve jump up and collect the fruit. Collect enough and a gian heart descends to take you to the next level.

In level two the snails and catapillars are joined b leaping frogs that bounce in your way, butterflies that flutte as you're about to jump and giant birds with a predictabl form of attack.

These airbourne hazards make timing in your jump critical so that you leap through the air and land before critter comes along. To add to your troubles there are mor gaps to leap which the lemming-like snails and catapillar hurl themselves down. The gaps are also wider and som even have moving platforms floating in the middle that yo must use as aerial stepping stones.

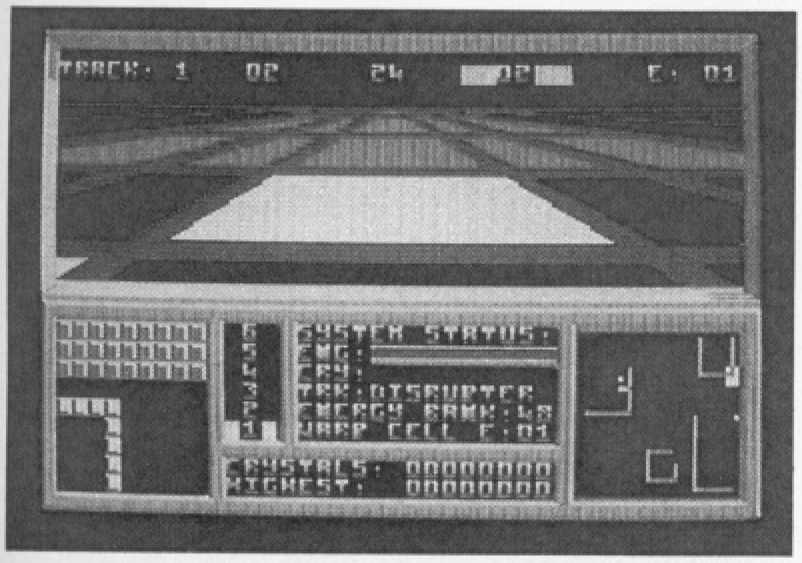
As you progress through the levels you gradually evolv to meet the increasing challenge until finally you become th Equalizer. T.H

Touchline
Title: *The Equalizer.* ***Supplier:*** *The Power House, CRL House 9 Kings Yard, Carpenters Rd, London E15 2HD.* ***Tel:*** *01 98 6877.* ***Machine:*** *C64.* ***Price:*** *£1.99.*
Originality: *7/10.* ***Playability:*** *7/10.* ***Graphics:*** *5/10.* ***Value*** *5/10.*

SUN STAR

Charging around a high energy grid while chasing green pulses isn't the easiest way to earn a living but that's the way of a Sun Star pilot.

The Sun Star pilots were first commissioned when the



Sun grids, built to create energy crystals also developed unstable disruptor pulses making collecting in a normal craft suicidal.

Specially developed ships were designed for exceptional pilots to fly through the grids at breakneck speeds. Skill and incredible reactions are required to chase the white pulses that when blasted switch to the energy rich green crystals that tear off at high speed. If you're quick you can track them down without smashing into the grid wall or colliding with one of the yellow obstruction pulses or energy draining red pulses.

Long and short range scanners plot your position which is shown on the 3D display that fills half screen. Although, it is unlikely you'll have time to study these.

This is definitely a game to play in the dark with the volume dial turned to maximum. Then let them have it!

Once you've filled up your energy banks with crystals, it's off to the hyperwarp cell and the next grid. This isn't easy and will take some time. If you miss out on one crystal, all the others you've collected burn out. T.H

Touchline

Title: *Sun Star.* ***Supplier:*** *CRL, CRL House, 9 Kings Yard, Carpenters Road, London E15 2HD.* ***Tel:*** *01 985 6877.* ***Machine:*** *C64.* ***Price:*** *£8.95.*
Originality: *8/10.* ***Playability:*** *6/10.* ***Graphics:*** *5/10.* ***Value:*** *7/10.*

FA CUP 87

FA cup 87 is the updated version of Virgin's FA Cup Football that was released last year and is the game in which up to eight players can manage up to 10 teams on the road to Wembley.

You can select your 10 teams from any of the 92 league teams and dozens of past and present giant killers such as Telfort United and Blyth Spartans. Ten may sound a lot but you'll need them all to stand any chance of having an interest in the later rounds.

You can begin the game in either the first round or straight into the third round when the first and second division teams join the competition however some of your lower division teams may have been knocked out already.

In each round the computer makes the all important draw and then you must decide the tactics for each of your teams and determine whether they will play a balanced team, go for goals in an all out attacking style or sit back and defend all game.

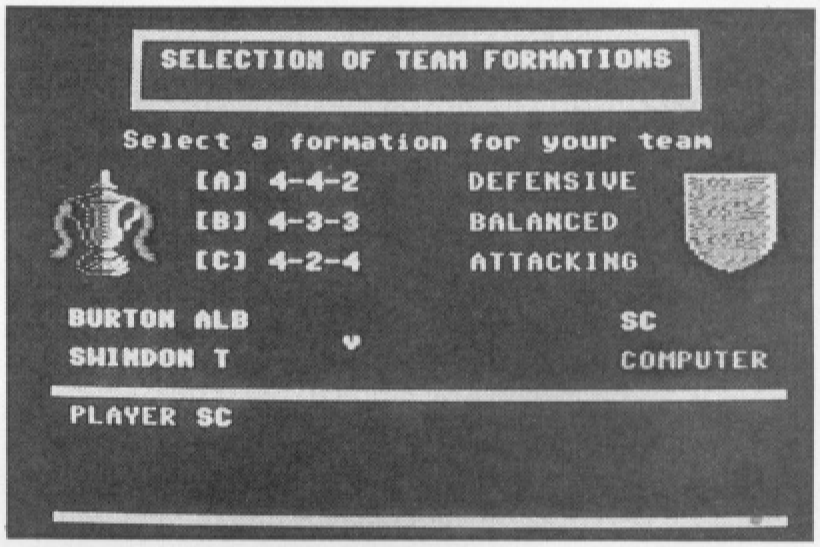
In later rounds you get to change the tactics at half time and an option to bring on a substitute. You also have to make managerial decisions. These involve choosing which studs to wear in damp weather and whether to play your top player even though he's injured or has asked for a transfer.

This updated version is supposed to contain the latest form for each of the teams. Since the data is spread over the last 10 years the information and performance of the teams hasn't changed that much from the original to be worth producing another full priced game.

If you have the original game it just isn't worth buying this one as it's almost identical. If you haven't got the original and you like football that you'll like this even though it is grossly overpriced by today's standards. T.H.

Touchline

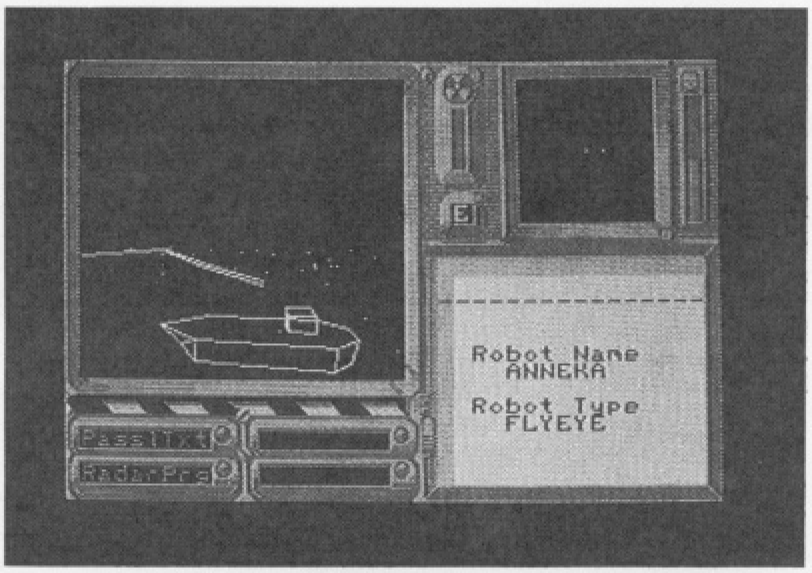
Title: *FA Cup 87.* ***Supplier:*** *Virgin Games, 2-4 Vernon Yard, Portobello Road, London W11 2DX.* ***Tel:*** *01 727 8070.* ***Machine:*** *C64.*
Originality: *2/10.* ***Playability:*** *8/10.* ***Graphics:*** *3/10.* ***Value:*** *3/10.*



CHOLO

Deep below the surface of the planet Cholo, man is living a miserable post holocaust existence. The robots programmed to defend the city, while man is in his forced exile, have turned renegade and are planning to seal them in forever!

Oblivious to your fate you continue to listen to the false reports coming from topside and carry on playing the popular computer game, "Rat". The game features moving robots around a deserted city that looks surprisingly like Cholo. Too similar. As you begin to play the game, you have just realised that you're in contact with one of the robots on



the surface and you've got your work cut out if you're going to stop the impending doom.

Armed with only a pre-war map of Cholo (supplied with the game) you must move your robot (a general purpose rat called Rizzo) around the city, find out what's going on and stop it! Rizzo is a useful robot but he's going to need help if you're going to stand any chance so you must set out to find some new recruits by paralysing them with Rizzo's laser and interfacing with them. To do this you must track them down, blast them into submission and discover the correct ID code. Luckily a list of these is stored in a nearby computer. If only you could find it.

The game unfolds as a series of complex puzzles that must be solved using Rizzo's talent to "recruit" others and discovering the strengths and weaknesses of the other robots.

Your first recruit is likely to be Igor the Hacker who is unarmed yet vital as he can get more programs out of the computers, such as a radar program that plots the movement of all robots in your immediate surroundings. Next you'll find a flying eye called Anneke that can scout from the safety of the skies, and Leadcoat, an all out battle droid.

Your attempts to free mankind are constantly hampered by the attacks of the guard and grundon robots that are too thick to be any use and usually shoot on sight. They usually hunt in packs making the guards difficult to fight and the grundons impossible.

Cholo's a fascinating game that's a mixture of arcade battles with the guards, puzzles to discover the best uses of your robots and exploration of the vector graphic city. At times the action is painfully slow but also incredibly addictive as you delve deeper and deeper into the game's sinister atmosphere. **T.H.**

Touchline
Title: *Cholo.* ***Supplier:*** *Firebird, Wellington House, Upper St., Martins Lane, London WC2H 9DL.* ***Tel:*** *01 379 6755.* ***Machine:*** *C64.*
Originality: *8/10.* ***Graphics:*** *6/10.* ***Playability:*** *7/10.* ***Value:*** *7/10.*

ROCKET ROGER/BLAGGER

First, there were budget games. Now, from Alligata comes a series of double value budget games! Two of their previous top titles on one tape and all for only £1.99.

The first tape has a definite platform bias about it. Rocket Roger sees our eponymous hero trying to find fuel for his stranded space ship. Ninety nine crystals are hidden somewhere on the dark mystery planet.

Rocket Roger, as his name implies, is equipped with a jetpack and must use it in order to manoeuvre himself round the surface — a deft touch is required here as the slightest mistake spells doom. The jetpack only has a limited amount of fuel and must be topped up at periodic intervals. As the action shifts to a more traditional platform game scenario with sliding doors, laser beams and invisible force fields. Not forgetting of course, the many aliens intent on hindering Roger wherever possible.

Blagger, a.k.a. Roger the Dodger is a thief. His speciality is safe cracking and here are 30 that will test his skill to the very limit. Each safe requires a number of keys to open it and these are scattered round the screen, protected by marauding nasties, collapsing platforms, one way staircases and the like.

One minor drawback is that you must always start at the beginning and work your way through in each screen in order — a random element would have helped here, especially since once you know the secret of a particular screen, completing it on future occasions becomes trivial. Even so, there is still the temptation to have just one more go and see what the next screen is like. **G.R.H.**

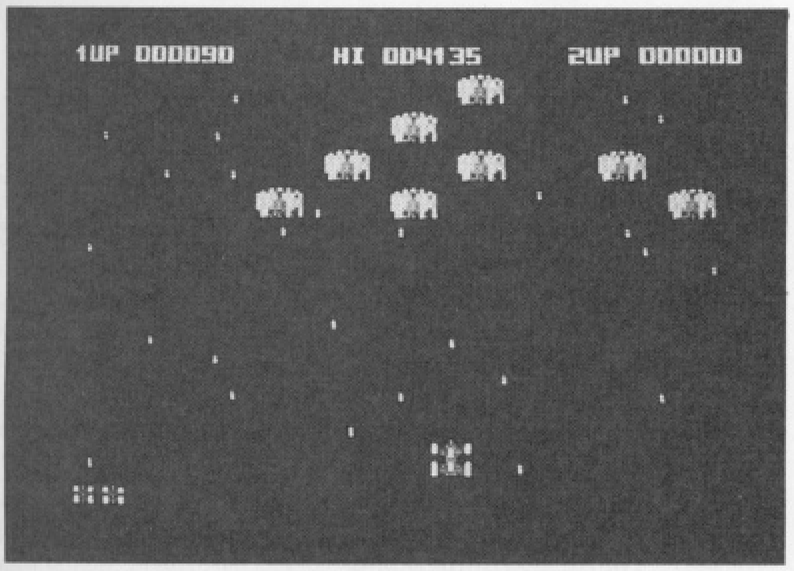
Touchline
Title: *Rocket Roger/Blagger.* ***Machine:*** *C64.* ***Supplier:*** *Alligata Budgie, 1 Orange Street, Sheffield S1 4DW.* ***Price:*** *£1.99.*
Originality: *3/10.* ***Graphics:*** *5/10.* ***Playability:*** *8/10.* ***Value:*** *10/10.*



EAGLE EMPIRE/GUARDIAN

Alligata's second budget double header contains two space shoot-em-ups. Eagle Empire is a version of the arcade game Phoenix whereas Guardian has its origins in the ever popular Defender.

The objective in Eagle Empire is to blast your way throgh to a final confrontation with the Master Alien, hidden deep within his mothership. Before you get that far though, you must first destroy four waves of defending aliens. These consist of two waves of phoenixes followed by two further



waves of war eagles. The game is beginning to show its age now and looks very dated when compared to recent shoot-em-ups.

This slight disappointment, however, is more than made up for by Guardian. Even today, it is by far the best version of Defender around. For anyone unacquainted with the plot, you are trying to stop various alien craft landing on your planet and kidnapping the humanoids. Should they succeed, the humanoid mutates into a deadly pursuit vehicle. As if that were not enough, there are also swarmers, baiters, bombers and pods to avoid. All you have to help you is your trusty laser and three smart bombs. Guardian is extremely fast and will test your reflexes to the full. **G.R.H.**

Touchline
Title: *Eagle Empire/Guardian.* ***Machine:*** *C64.* ***Supplier:*** *Alligata Budgie, 1 Orange Street, Sheffield S1 4DW.* ***Price:*** *£1.99.*
Originality: *3/10.* ***Graphics:*** *5/10.* ***Playability:*** *9/10.* ***Value:*** *10/10.*

STAR RAIDERS II

The original Star Raiders amazed Atari owners and rapidly became one of Jeff Minter's favourite games. Unfortunately, it was never converted for the C64. Now its sequel is set to push you to your limits.

In the original game, Star Raiders commanders blasted the Zylon empire into submission but now the few that were allowed to live have rebuilt their forces and are out for revenge. As Star Raiders II begins, the Zylons have invaded the Celos IV system.

Your mission is to pilot the Liberty Star fighter and not only protect the four planets of Celos IV but also attack the Zylon planets to destroy the attack bases that can produce Zylon ships faster than you can shoot them!

The Liberty fighter is equipped with three computer controlled weapons systems to fry Zylons and shields and warning lights to give you a chance of staying alive. Twin firing pulse laser cannons can be fired to take out Zylon fighters that seem to swoop just beyond your sights, ion cannons throw torpedoes at the city smashing Zylon destroyers and surface star bursts can be used to bomb the lethal attack bases.

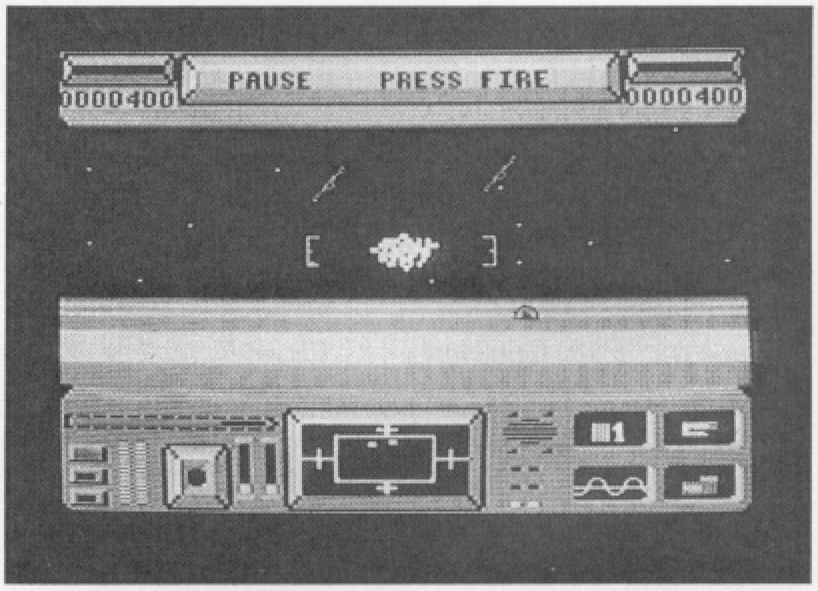
All this action is bound to be a strain on both you and your ship and so you should take a breather at a space station to refuel and repair before warping back into the action.

The system display shows the four planets under seige and plots the position of any incoming Zylon fleets. It's up to you to decide when to defend a specific planet, or a space station, dogfight with the fleets or attack the Zylon bases. The secret of success and glory is to time each of these moves so that you get one step ahead of the Zylon hordes and not constantly chasing them.

Your performance in the game is reflected in the rating you're given that can range from ensign to admiral and the mission report that displays the number of Zylons you've crashed.

The Zylons have you desperately outnumbered and so you must act and think quickly and learn the tactics to take out the different types of alien ships. The fighters appear in groups of three so it's worth a few speculative shots as soon as you see one to take out the followers. The city smashing destroyers are harder to hit and take more hits to kill them, so practice will soon pay off. The same is true for bombing the cities as the bombs must be dropped in front of the target to land on top of the city. The only problem with this is you're constantly attacked by fighters that you can't shoot (because you're bombing) and the Zylons may have destroyed your repair stations while you weren't looking. **T.H.**

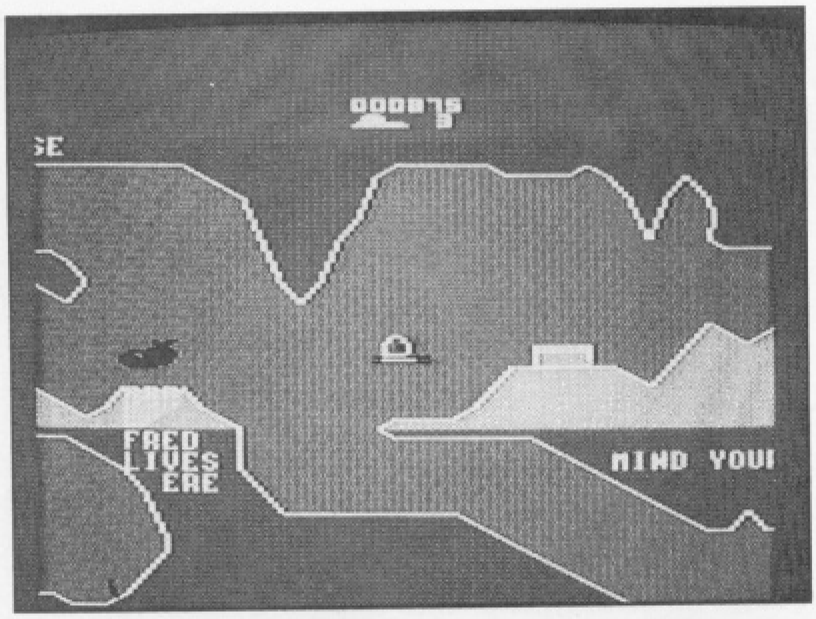
Touchline
Title: *Star Raiders II.* ***Supplier:*** *Electric Dreams, 23 Pond Street, Hampstead, London NW3 2PN.* ***Tel:*** *01 431 1101.* ***Machine:*** *C64.* ***Price:*** *£9.99 (cass) £14.99 (disk).*
Originality: *4/10.* ***Graphics:*** *6/10.* ***Playability:*** *8/10.* ***Value:*** *7/10.*



KILLER WATT/HYPER CIRCUIT

The third of the Alligata budget double packs has a decidedly electrical theme to it.

In Killer Watt, you are exploring a huge underground cavern lit by a dozen light bulbs. These must all be shot before you can blast your way through a final force field. As well as negotiating the tortuous twists of the cave, you must



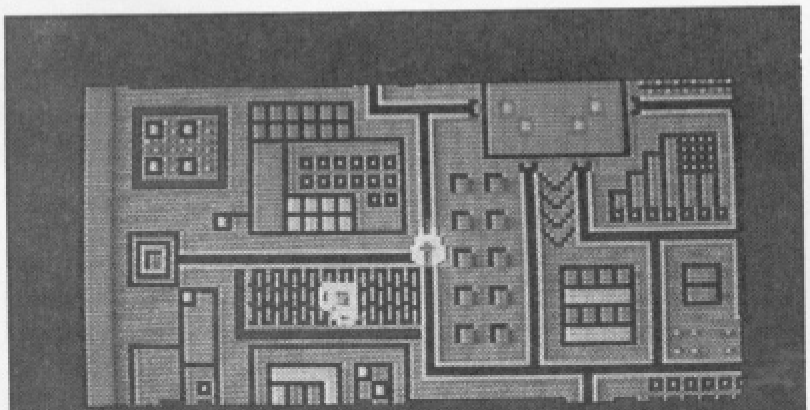
also avoid flying dolphins, birds and bombs if you are to succeed. If this should prove to be too easy a task, you can be sure that subsequent levels won't be, as the number of creatures increases considerably.

What makes this a difficult task is that your ship is very highly manoeuvrable. The slightest touch on the joystick and it accelerates away like mad, usually, straight into the nearest wall. Braking is also difficult due to the inertial system built in. What is really heartbreaking though is that when you lose a life, you must watch as the cave scrolls slowly back to the starting point. A brilliantly cruel ploy on the part of Tony Crowther, the programmer. All this to the accompaniment of some synthesised Bach too.

Hypercircuit takes you deep into the bowels of your computer as you enter the world of the microchip. Your aim is to patrol the chip, taking out the assorted nasties before they do likewise to you. Your movement is restricted to travelling down wires and your firing is similarly limited but beware, some of the baddies hâve total freedom of movement so make sure that you don't get caught in a dead end.

G.R.H.

Touchline
Title: *Killer Watt/Hyper Circuit.* ***Machine:*** *C64.* ***Supplier:*** *Alligata Budgie, 1 Orange Street, Sheffield S1 4DW.* ***Price:*** *£1.99.*
Originality: *4/10.* ***Graphics:*** *7/10.* ***Playability:*** *7010.* ***Value:*** *9/10.*



SHORT CIRCUIT

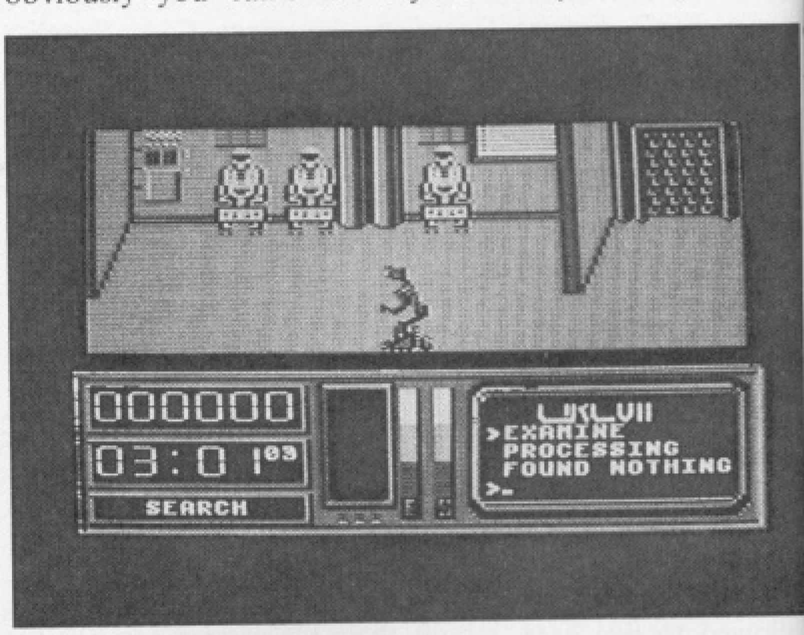
Number 5 is alive. Struck by a bolt of lightening, he is now battling to stay alive and reach freedom. Short Cirtuit is an arcade adventure game brought out following the release of the film of the same name. Can you help Number 5 in his mission? It won't be easy. Everyone is against him, trying to blow him up or take him to pieces.

Having stirred to life in the factory Number 5 cannot just escape from the building. He must first find hardware and software to activate his jump and laser mechanisms and also the manual used for building him so that he can build a decoy to put his enemies off his trail.

Some areas of the game are quite difficult, especially getting past robotic guards but if you stick at it you will succeed. There are quite a few items to collect inside the factory, such as a jump rom, a laser gun made from red and white plastic, a pass card and Rex (a labrador puppy with toilet roll round his neck, found in a locker). Number 5 must take these and other items outside the factory where he enters part two of the game.

Once outside the guards and other robots continue to give chase but here you have also got to avoid the wildlife. Animals such as frogs, bunnies and hedgehogs insist on throwing themselves at you while you are trying to avoid everything else. If you manage to avoid them you gain points but if you stand on them or hit them your energy rapidly runs out.

If you find you are having problems with part one you can go on to part two and practice with that though obviously you can't build your decoy until you have



obtained all the items from part one.

I found the game quite entertaining but difficult at times. If you like a challenge it could be your game. I must however warn you that the music is very monotonous. The first few times it is quite good but then it just goes on and on. The music in the second part is a bot of an improvement.

Anyway, happy robotics and good luck in your mission. Number 5's happiness depends on you.

S.C.

Touchline
Title: *Short Circuit.* ***Supplier:*** *Ocean, 6 Central Street, Manchester M2 5NS.* ***Tel:*** *061 832 6633.*
Originality: *8/10.* ***Playability:*** *6/10.* ***Graphics:*** *7/10.* ***Value:*** *8/10.*

ening, he is
Cirtuit is an
he release of
ber 5 in his
m, trying to

5 cannot just
rdware and
sms and also
can build a

t, especially
it you will
t inside the
rom red and
puppy with
mber 5 must
y where he

continue to
the wildlife.
gs insist on
ng to avoid
gain points
rapidly runs

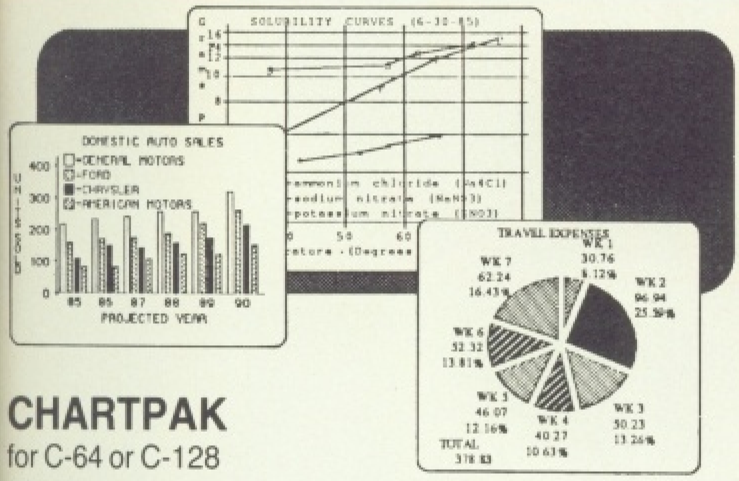
art one you
hat though
l you have

cult at times.
ust however
The first few
and on. The
vement.
our mission.
S.C.

ntral Street,

7/10. **Value:**

C64/128 Productivity Software from Abacus Software



CHARTPAK
for C-64 or C-128

CHARTPAK lets you make professional quality charts *fast* – without any time consuming programming. Enter, edit, save and recall your data, then interactively build your pie, line chart or scatter graph. You specify scaling, labeling and positioning. CHARTPAK instantly draws the shart in any of 8 different formats – you can change your format immediately to draw another chart type. Other features include statistical routines for average, standard deviation, least squares and forecasting. You can also use data from spreadsheets such as Multiplan, Calc Result or Busicalc. CHARTPAK records your final results on Commodore 1525/MPS-801/1526, Epson, Gemini, Okidata (including Okimate 10/Colour) or C. Itoh prowriter dot-matrix printers.

AB 542	Commodore 64 disk	**£24.95**
AB 544	Commodore 128 disk	**£34.95**

CHARTPLOT-64

Has all of the same features and functions of its sister program ChartPak, but plots your results on plotters. You control the chart building from your keyboard. CHARTPLOT-64 lets you record the final results in colour on Amdek, Hewlett-Packard, Houston Instruments, Roland DG, Strobe or Sweet-P plotters, as well as the 1525/MPS-801/1526, Epson, Gemini, Okidata (Okimate black & white only) or C. Itoh Prowriter printer.

AB 547	Commodore 64 disk	**£34.95**



CADPAK
Computer-Aided Design package for C-64 or C-128

Enhanced Versions

CADPAK is a superb tool for computer-aided design and drawing. Using either the keyboard or optional light-pen you draw directly on the screen to create and edit pictures, drawings, layouts and renderings – quickly, accurately, creatively. The unique *dimensioning* feature allows exact scaled output of your designs. Choose from the menu options and draw on the screen at an exact location using our *AccuPoint* cursor positioning. Using the two graphics screens, you can draw lines, boxes, circles, ellipses; fill with solid colours or patterns; freehand draw; copy sections of the screen; Zoom in to do detailed design on a small section of the screen. With CADPAK's improved object editor, you can define and save furniture, electronic circuitry, machinery, etc. as intricate as the screen resolution permits. Hardcopy to most dot matrix printers. Perfect for all your design needs.

AB 770	Commodore 64 disk	**£24.95**
AB 774	Commodore 128 disk	**£34.95**

C64/128 Language Software from Abacus Software

C Language

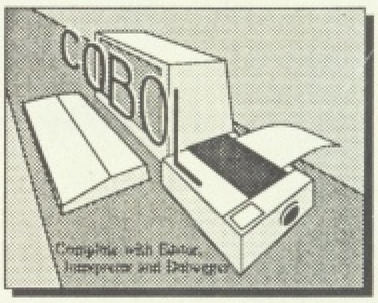
Learn the the language of the 80's and beyond

on your C-128 and C-64

SUPER C
Language Compilers

One of the today's most popular languages, C is excellent as a development tool, produces 6502 machine code – and it's easy to transport C programs from one computer to another. Our compiler makes full use of this versatile language; it includes an editor, compiler, linker and handbook. The powerful editor lets you create source programs containing 80 character lines, and features horizontal scrolling. Your source program can be up to 41K in length, 53K in object code. The linker lets you combine up to seven modules for later execution. The runtime library may be called from machine language or included as a BASIC lookalike program. This really is a Super package.

AB 880	Commodore 64 disk	**£44.95**
AB 882	Commodore 128 disk	**£44.95**



COBOL
for C-64 or C-128

Now learn this universal business language on your Commodore 64 or Commodore 128!

COBOL is the most widespread business programming language in use today. Now you can run this easy-to-use, English-like language on your C-64 with the easy-to-learn COBOL System package. The COBOL System features a syntax-checking editor, interpreter, compiler, and a number of symbolic debugging aids; a crunch function to reduce the memory size of your programs; a print on/print off feature, and much more. Includes sample programs to help you learn as you go, as well as a complete 150-page manual.

AB 650	Commodore 64 disk	**£34.95**
AB 652	Commodore 128 disk	**£34.95**



XPER-64 Expert System

XPER is the first expert system for the Commodore computer. Ordinary data base systems are good for reproducing facts, but an expert system *guides you through* a mountain of facts – allowing you to make expert decisions. Using this unique knowledge-based package, you first build the information into your data base using XPER's simple loading procedures. Then, by using fast, efficient searching techniques, XPER easily guides you through the most complex decision-making criteria. Includes full reporting and data maintenance capabilities. Currently used by scientists, doctors and professionals.

AB 710 Commodore 64 disk

£44.95

ORDER FORM Mail to: Precision Software Limited, 6 Park Terrace, Worcester Park, Surrey KT4 7JZ

Please send me

Add £1.40 per item postage and packing. Free postage and packing for three or more items.

Cheque enclosed ☐ Visa ☐ Access/Mastercard ☐

(Credit Card Number)

Expiry Date

Signature

Name

Address

Post Code

Available from your local dealer or directly from
Precision Software Ltd. 6 Park Terrace,
Worcester Park, Surrey KT4 7JZ
Telex 8955021 Precis G
01-330 7166

Precision Software

Colonial Conquest

Wargames don't usually get the publicity that they deserve, perhaps because they are considered a minority interest. Here's one which should definitely appeal to the masses.

By Tony Hetherington

Imagine a game that's captured the best features of classic board games such as Risk and Diplomacy but can also provide devious and ruthless computer opponents. Imagine a game in which six players compete for global power by bribery, espionage, deception and war! You're imagining the award winning global strategy game from SSI.

Computer and human players take the role of empire builders as they attempt to steer England, France, Germany, Russia, USA or Japan to global dominance.

Three different scenarios are set in the turbulent times between 1880 and 1914 when a gunboat was the accepted form of diplomacy.

The standard scenario confines the player powers to their own borders as the game begins with neutral continents such as Africa, India, Australasia and South America ripe for the picking. These neutral countries, although packed with their own armies, form the stepping stones for empires as the taxation income they bring in adds to your own resources to





GAME OF THE MONTH

provide the funds to raise armies and navies.

The game is played in a series of turns with four turns played in a year. In each turn the players move their armies from any of the 131 board areas to an adjacent area and their navies either on naval sorties to maintain naval supremacy or to convoy armies to anywhere in the world. However they can also fortify areas to defend them from attack, send spies to scout out opposing armies' strengths, try to subvert neutral countries with the offer of bribes, pay off unwanted aggressors and ally, deceive, backstab and fight the other human players. The only thing you're not allowed to do is watch while another player enters his moves. But you can use this time to plot against him. Obviously this only works with three or more human players but you will find the computer opponents formidable even at the lowest of their 10 skill ratings.

The aim of the game can be defined as either the first to attain 500, 1000 or 1500 points or to win control of the world. Points are won by winning battles, taking territoriees and whole regions (or continents) and lost by losing any of these. The points value gained varies country to country but also reflects the strength of the resident army and the difficulties you'll face in defending it. Some neutral armies can be as small as 10,000 soldiers or as high as 400,000!

To add to your planning problems each power has different strengths and weaknesses. English soldiers are the best trained but are the most expensive to raise whereas the Russians are cheaper but are little more than a rabble. You can also dig your troops in by fortifying them, making them twice as hard to shift and you can convoy in reinforcements from your home country to anywhere on the board.

In the early years there are plenty of neutral countries such as the African and Indian states to convert which tends to keep the powers apart as they all grow in strength. But sooner or later they collide as war breaks out. Once war is declared the computer will attack you whenever and wherever it can, so unless they strike first, try and restrict your enemies as it's difficult to take on the whole world at once.

In the other scenarios the world map is a little more complicated with the powers already occupying most of the neutrals making war almost inevitable. Understandable when one of the scenarios begins in 1914!

Whichever scenario or country you choose to play you'll find an easy to play yet challenging strategy game that will drive you back again and again until you quench your thirst for power! YC

Touchline

***Title:** Colonial Conquest. **Supplier:** SSI, 2/3 Holford Way, Holford, Birmingham B6 7AX. **Tel:** 021 356 3388. **Machine:** C64.*

***Originality:** 7/10. **Playability:** 10/10. **Graphics:** 6/10. **Value:** 9/10.*

W
isn't it
one p
W
simpl
separ
into
indivi
varia
the s
conv
whils
depe
The c
place
progr
If
you
will
that
A
conf
coul
tool
prog
two
once

Dual Programming

Chop your Plus/4's memory in half and get twice the value

By Jonathan Morley

With all your Plus/4's memory isn't it a bit silly that you can only have one program in the memory at a time?

Well look no further than this simple program. It works by separating your computer's memory into two halves, each working individually with its own set of variables etc. Some functions such as the screen remain the same for your convenience and speed of change, whilst graphic modes and sounds are dependent upon which area you are in. The cursor, for instance, moves to the place where it would have been had the program area not been changed.

If a program is left running, when you return to it, the operating system will re-start at the next command in that program.

All of this may at first seem confusing but with a little time this could become a treasured programing tool allowing you to switch from one program to another or simply just have two basic programs in the memory at once.

Theory

The way in which the program works is simple: when a short machine code routine is called it switches the constants, parameters and pointers at the beginning of the memory for another set relating to the second program area, and stores the first.

Using It

You are now ready to program and experiment; load your old programs into either area, write new ones or add new parts to your main program. You are limited, as ever, only by your own imagination so HAPPY PROGRAMMING! and remember that at any time to switch areas all you need to do is type SYS1525 in your program e.g.

```
10 print "leaving now"; :SYS1525:
print "back again"
run <RETURN>
```

(If an error signal appears ignore it, this is just a result of the initial changes).

You are now in the other area press F4 (shift to F1) to clear the screen and then F1 which types SYS 1525 for you and you will be back into the other mode where the program will finish running.

N.B. Adept C64 programmers will find that the principle of swapping the zero-page, and a few other parameters, will also work for them as long as they are careful to change addresses 44 and 56 to the correct values.

A Machine Code Exert

The main machine code that does this is in Figure 1.

Instructions

To enter the program, type in the LOADER and SAVE it.

Every time AFTER you RUN this program set up your boundaries by typing the instructions in Figure 2. YC

PROGRAM: LOADER

```
10 POKE 34560,0:POKE34561,0
20 D=0
30 A=64000
40 READB:POKEA,B:A=A+1:D=D+B
50 IFB=96THEN60:ELSE40
60 A=1525
70 READB:POKEA,B:A=A+1:D=D+B
80 IFB=96THEN90:ELSE70
90 KEY1,"SYS1525"+CHR$(13)
100 DATA162,0,181,0,72,189,0,252
110 DATA149,0,104,157,0,252,232,
208
120 DATA241,162,6,189,0,255,72,1
89
130 DATA0,251,157,0,255,104,157,
0
140 DATA251,232,224,26,208,237,9
6
150 DATA120,141,63,255,32,0,250,
141,62,255,88,96
160 A=8000
170 READB$:POKEA,DEC(B$):A=A+1:D
=D+DEC(B$)
180 IFB$="60"THEN190:ELSE170
190 IFD<>10264 THENPRINT"TYPING
ERROR"
200 DATAA2,00,B5,00,9D,00,FC,E8
210 DATAD0,F8,A2,06,BD,00,FF,9D
220 DATA00,FB,E8,E0,1A,D0,F5,60
```

Figure 1

```
. fa00   a200       ldx # $00     index
. fa02   b5 00      lda $00,x     load mem
. fa04   48         pha           hold mem
. fa05   bd 00 fc   lda $fc00,x   load new
. fa08   90 00      sta $00,x     enter new
. fa0a   68         pla           get mem
. fa0b   9d 00 fc   sta $fc00,x   store mem
. fa0e   e8         inx           nech char
. fa0f   d0 f1      bne $fa02     go back
. fa11   a2 06      ldx # $06
. fa13   bd 00 ff   lda $ff00,x   do same
. fa16   48         pha
. fa17   bd 00 fb   lda $fb00,x   for colors
. fa1a   9d 00 ff   sta $ff00,x
. fa1d   68         pla           and sounds
. fa1e   9d 00 fb   sta $fb00,x
. fa21   e8         inx           etc.
. fa22   e0 1a      cpx # $1a
. fa24   d0 ed      bne $fa13
. fa26   60         rts           return
```

Figure 2

```
POKE56,134 <RETURN>      :to stop program 1 running into
                          program 2
CLR <RETURN>             :to align system variables
SYS 8000 <RETURN>        :to copy this patern into the storage area
POKE44,135 <RETURN>      :to start this area at the end of the last
POKE56,247 <RETURN>      :to define the end of this area
COLOR4,3 < RETURN >      :to distinguish each area
CLR < RETURN>            :to align system variables
NEW < RETURN>
SYS1525                  :change area
NEW < RETURN>
```

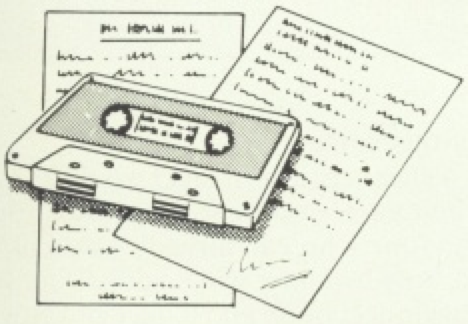
Your key to communications!



FREE Electronic Mail . . . International Telex . . . 10 National Chatlines (Interactive Bulletin Boards) . . . 70,000 users across the UK . . . Teleshopping . . . Multi-User Interactive Strategy Games



Instant computer news . . . Hardware and software reviews . . . Technical features . . . Hints and tips . . . On-line business advice and features



FREE and discounted quality software to download direct to your micro – **24 hours a day**

300,000 pages of information on the huge Prestel database

PRESTEL

PRESTEL is a trademark of British Telecommunications

for just 20p a day

Micronet 800 – The ultimate peripheral

Micronet 800
8 Herbal Hill, London EC1R 5EJ
Telephone: 01-278 3143

To: Micronet 800, 8 Herbal Hill, London EC1
Please send me a brochure on Micronet 800

Name ______________________

Address ______________________

____

______________ Telephone No ______________

Age ______________ Micro ______________

YC 6

I.Q.

Read on if you're a card fanatic and we'll tell you about the latest in bridge programs. Otherwise, we test the water on a budget adventure trilogy.

CLASSIC BRIDGE

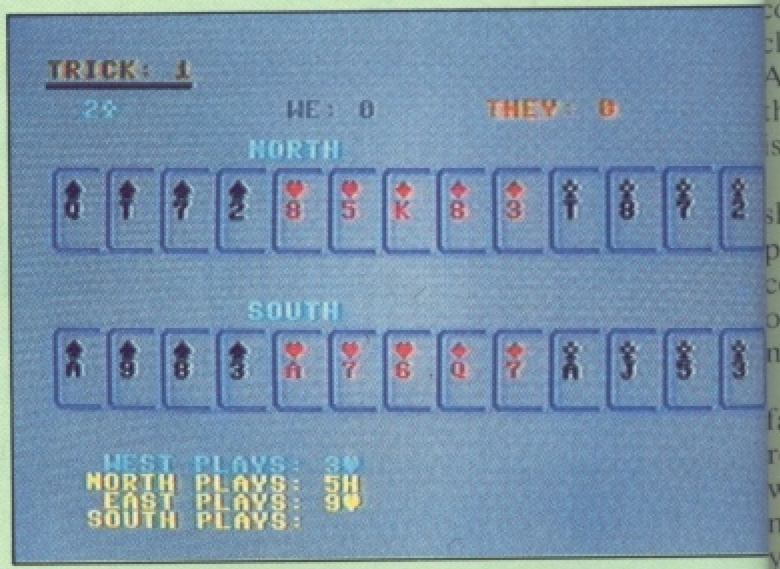
For a variety of reasons, bridge does not lend itself to the same sort of computer analysis as chess. This idea is well borne out when it comes to computer games. Whereas chess programs can now beat all but the top club players very easily, bridge programs can handle the display well enough — inputting the bids and cards to be played — but the actual nitty gritty of the game, the bidding and card play, is of a very poor standard.

The basic idea in bridge is for you and your partner to determine how many tricks you can make between you. This is done during the bidding where you try to assess where your strengths and weaknesses lie. If you outbid the opponents, then you must try and make the number of tricks that you declared for. If they outbid you, then you and your partner must try to defeat their contract.

In Classic Bridge, the computer handles the other three hands allowing you to play without having to find three like minded fellows first. Unfortunately, the game is of a very poor standard. There are a number of reasons for this. First, the game is very slow when it comes to actually dealing a hand. This would be bearable if you actually get a different hand each time but it is not quite as simple as that. Every time that you want to play a hand, you must input a number. This acts as a seed for the randomiser within the program. Whilst this means that there are a vast number of hands available to you, it also means that you must keep track of which numbers you have already used — otherwise you get the same hands again. This proves to be very clumsy.

As mentioned earlier, poor bidding and card play is common to all bridge games currently available and Classic Bridge is no better or worse than any other program. Where there is a problem though is that the bidding system used is Goren. Although this is the system used by most Americans, it is totally alien to British players who normally play a system called Acol. In nearly 20 years of playing tournament Bridge, I have only ever met two pairs who play Goren! Again, this problem isn't insurmountable, but it does show a considerable lack of insight on the part of someone.

The main fault with the game, though, is in the cardplay. The program does not always remove the cards played by you. In one case, I was left with six cards in my hand when everybody else only had two left. The computer would not let me play any cards that I didn't actually hold, but this bug totally removed any last traces of pleasure I was deriving



from playing this game.

Bridge is a classic game. In fact I would go so far as to s[...] that it is the best game ever devised. Classic Bridge isn't. I[...] a travesty. Anyone who can already play will be extrem[...] disappointed. Any beginner will be put off for life. Don't [...] Buy a good beginners book and a pack of cards and find o[...] what you've been missing all these years. G.R.

Touchline
Title: *Classic Bridge.* ***Supplier:*** *Anco, 35 West Hill, Dartfo[...] Kent DA1 2EL.* ***Machine:*** *C64.* ***Originality:*** *N/A.* ***Graphi[...]*** *5/10.* ***Playability:*** *3/10.* ***Value:*** *2/10.*

OXFORD BRIDGE

Even though Bridge is the greatest game in the world, it do[...] suffer from one minor drawback. You do need four peo[...] to play it. Which is bad news if you are on your own or o[...] with one or two like-minded friends. This leads to a seco[...] drawback. In order to cater for these poor unfortunat[...] software companies will insist on trying to write a brid[...] program. One of these days, they will learn. It just does[...] work.

The latest people to try their hand is a company call[...] Thinking Games. This program features lots of optio[...] including some that I have not come across before in a brid[...] program but the final result is the same as every oth[...] attempt — failure. Here's why.

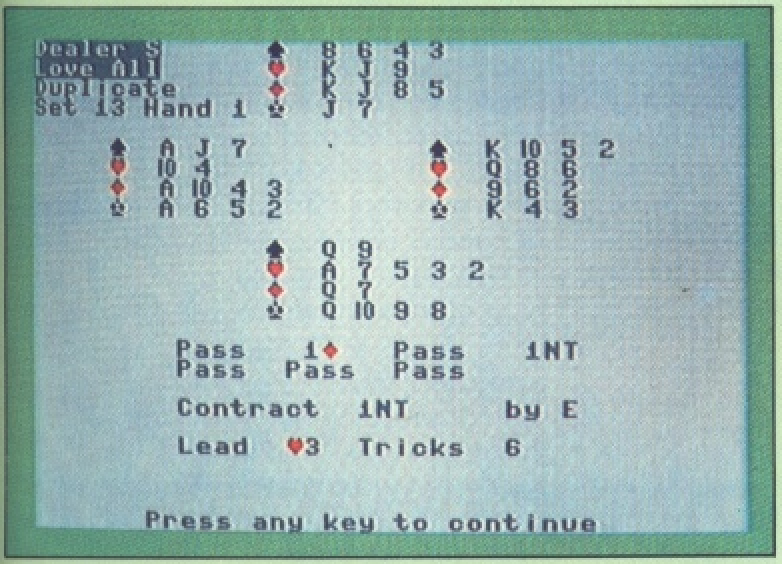
Presentationwise, the program is fine although the input routine could be improved. Every card played must be entered individually, singletons and cards played to the last trick could be handled automatically. A joystick option would also be a great help. Also, there is no claim option. This would allow declarer to claim some or all of the remaining tricks when it is perfectly obvious what the outcome of the hand is going to be.

In the actual playing of the cards, the program is better than most of its competitors but very predictable and at best no better than average. As in real life, its declarer play is better than its defence.

But it is in the bidding that the program falls down. Even without claiming to play any particular system (natural, weak no-trump and no conventions i.e. not even Stayman or Blackwood) the bidding is a farce. A typical example was this hand. Holding S K1072, H KJ85, D AQJ3, C Q, the computer correctly opened one heart. The response was two clubs and it now found the monstrous bid of three spades! Apart from totally misdescribing the strength and shape of the hand and using up vast amounts of bidding space, the bid is fine.

Before Thinking Games get too upset about this, I should point out that this is something common to all bridge programs released to date (and I suspect for many years to come). The bidding is far and away the most important part of the game and the fact that the program can't cope makes a mockery of everything else.

The novel feature about Oxford Bridge is the duplicate facility. The results of the hands can be saved on disk and replayed by several other people at a later date. The program will then score as in any duplicate pairs event. It's all very nice but the problem is, I can't actually see anyone using it. If you have enough people available to use the facility, you might as well sit down and play the real thing.

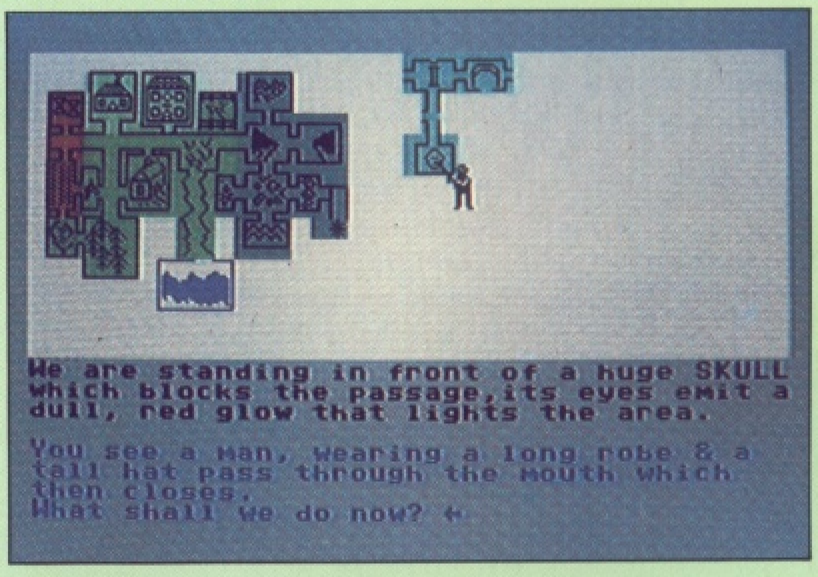


The bad news doesn't end there either I'm afraid. The price of this package is absolutely ridiculous. At just under £30 for the tape and £35 pounds for the disk version, I reckon that it is overpriced by at least £20. For the money it costs, you could buy several bridge books, bridge evening classes for a year or, perhaps best of all, membership of a couple of your local clubs. Then you need never be short of a fourth player again. Bridge, unlike chess, is a social game. Let's hope it always remains that way.

G.R.H.

Touchline
Title: *The Oxford Bridge Program.* ***Machine:*** *C64.* ***Supplier:*** *Thinking Games, 19 Newton Road, Faversham, Kent ME13 8DZ.* ***Price:*** *£29.95/£34.95 cass/disk.*
Originality: *N/A.* ***Graphics:*** *6/10.* ***Playability:*** *4/10.* ***Value:*** *1/10.*

KET TRILOGY



There wasn't really any choice in the matter. You had been framed for a murder and the verdict was execution or the small matter of saving the Lands of Ket from the vicious attacks led by King Vran, leader of the Mad Monks and his assistant, the High Priestess Delphia. Naturally, you opted for the chance to be a hero. Even though the odds on you surviving were small, they had to be greater than the first choice. Just in case you decided to do a quick moonlight flit, they fitted an assassin bug into your neck ready to deliver a fatal nibble should you attempt anything naughty.

The game consists of three different adventures. In The Mountains of Ket, you have to find the secret entrance to the mountains and then negotiate the perils that lie within. In the Temple of Vran, you must destroy the evil forces lurking within the temple and, in the Final Mission, you must seek a final confrontation with Vran himself as well as making sure that you can escape at the end of it. Although all three adventures are linked, you can play each one separately which is good news if you happen to get stuck early on.

As the games are fairly old, the parser is quite crude — verb/noun input only. There is also a rudimentary combat system — your strength against that of your opponent with a luck factor thrown in for when you try to escape. The unusual bit though is that instead of using pictures to illustrate some of the locations, the top half of the screen provides a map of the areas that you have visited. This is a nice touch and should appeal to beginners and those adventurers forever getting lost alike.

Although the games are a bit dated now, they are still fun to play and £7.95 for the three adventures is good value.

G.R.H.

Touchline
Title: *The Ket Trilogy.* ***Machine:*** *C64.* ***Supplier:*** *Incentive Software, 2 Minerva House, Calleva Park, Aldermaston, Berks RG7 4QW.* ***Tel:*** *07356 77288.* ***Price:*** *£7.95.*

Cadpack-64

Increasingly, professional people are using computers aided design in the office. This package makes it available in your home.

By Evelyn Mills

Computer Aided Design – CAD in brief – is a well known method for executing graphic designs. In general, CAD is aimed at the architect, the professional designer, the graphic artists etc., and is not intended as a sketching tool for the free-hand artist.

Cadpak-64, however, is more flexible in this respect, and when used in conjunction with ther ecommended light pen can almost be considered as a CAD-ART package! The light pen is very satisfactory (brighten up your screen first) and gives good free-hand drawing: there is no need however to indulge in the luxury of extra expense as the complete system is cursor controlled.

Before buying any CAD package, find out what it can do, what you are getting for your money and, more important – are your printer outputs scaled properly with respect to proportional input? Having investigated *Cadpak* with considerable care, I can thoroughly recommend it for reliability,printer accuracy and interesting flexibility.

The Manual

The manual may be a bit obscure if you are a casual programmer. Indeed it needs careful reading to grasp the full potential of *Cadpak* – there are so many extras here which you might well miss through 'rapid scanning'. The best way to test the package in full is to take it section by section (logic!).

While there is a Main Menu with 22 functions, there are equally important sub-divisions of this which you should certainly use to the full. They are all detailed both in the Manual and on-screen, and the very excellent index at the back will help you with continuity.

Facilities

Right then – what can *Cadpak* do? While there are the usual facilities for colour selection, circling, boxing, ellipsing, rays, filling, zoom, etc. it would be more useful to detail the more advanced features of *Cadpak*.

Printers output (to eight printer makes) is DIMENSIONED automatically according to the dimensions keyed in. Relevant answers to the questions asked will do the job and the x,y co-ordinates may be keyed in with the Logo key; the computer will then automatically show you the distance you are from the starting co-ordinates as you move around the screen. Positions for objects may be keyed in as required, and distances measured – which all adds up to accurate scale drawing.

The LINE function allows solid and dashed line drawing, either as single or connected lines. Forced horizontal, vertical and parallel lines are available as is a true angle. ERROR erasure is very effective while there is, of course, total screen clearance.

FILLING may be solid or as a pattern. Happily the fill operation may be stopped with the space bar and undone with F4 should you miscalculate. While there are seven preset patterns from which to choose, the option to design and save your own pattern to disk is available – good opportunities here.

TEXT to screen is available in four sizes (also including upper and lower cases and reverse field). Three special Fonts are available – Old English, Tech and 3D Font. Full instructions are given for the loading and use of these fonts. Please note the instructrions as there are two screens available in *Cadpak* and screen two is required here.

Now the cursor keys will position

your characters in text very precisely, thus enabling individual letters to be located at any point on the screen. Should you wish to redesign a screen of Fonts – well the facilities are there- This could be used for technical and scientific labelling for example.

OBJECT/FONT/MGR – This is the most advanced function which enables you to create or load a set of objects. Here we have two screen manipulation which is completely automatic. When in screen two, there are three options available: a) scratch anything already there; b) copy whatever is on screen two to screen one where you are currently drawing, or; c) save screen two to disk. Your 'objects' may be rotated, mirrored or set to different sizes on the x,y axes as you wish. The Object System is capable of storing over 100 objects.

The COPY function works in one of two modes; the first copies a section of the screen, including colour, to another area on the same screen or another screen (BLOCK COPY); the second – POINT MODE – is virtually similar but allows the copied object to be changed in size, rotated or mirror imaged when copied in to either screen. There are a series of permutations and combinations in the COPY IN function (replace, combine, 'ghost', match, repeat etc.) which are described fully in the Manual.

SWAPPING SCREENS allows interchange between the two screens in memory.

The DRAWING CURSOR SIZE may be scaled down from original large size to one quarter of same to facilitate the handling of small drawings.

The FUNCTION keys are used for erasure control, cursor priority, ligh pen calibration and Basic/ Graphic screen switching.

DISK commands allow formatting validating, renaming, file scratching and disk directory as well as the standard procedures for saving and loading. PRINTER OUTPUT is set for 8 printers in either small or large format and is true to scale.

Conclusion

Cadpak is a really powerful tool, accurate, smooth running and very versatile. It combines a large number of features required by the professional with some flexible artistry which anyone can enjoy. The manual has all the information necessary plus two tutorials (for lightpen and cursor use). A very useful third tutorial takes you through planning and executing a scale drawing for a house of specific dimensions. Having done so, you may then decide what can fit in where!

You could pay a lot more for a package of this quality. YC

TOUCHLINE
Title: *Cadpack - 64.* ***Supplier:****Abacus Software, Adamsoft, 18 Norwich Ave. Rochdale, Lancs ON11 5JZ.* ***Tel:*** *0706 524304.***Price:** *£24.95.*

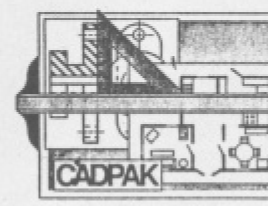
ABACUS SOFTWARE PRODUCTS
from ADAMSOFT

CADPAK Enhanced Version!
For C-64 or C-128

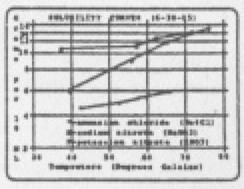
ONLY AVAILABLE ON DISK

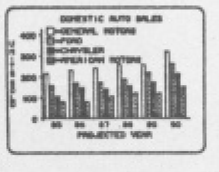
CADPAK is a superb tool for computer aided design and drawing. Using either the keyboard or optional lightpen you draw directly on the screen to create and edit pictures, drawings, layouts and renderings—quickly, accurately, creatively. The new *dimensioning* feature allows exact scaled output on your designs. Choose from the menu options and draw on the screen at an exact location using our *AccuPoint* cursor positioning. Using the two graphics screens, you can draw LINE's, BOXes, CIRCLEs, ELLIPSESs; fill with solid colors or patterns; freehand DRAW; COPY sections of the screen; ZOOM-in to do detailed design on a small section of the screen. With CADPAK's improved object editor, you can define and save furniture, electronic circuitry or machinery as intricate as the screen resolution permits. Hard copy to most dot matrix printers. Perfect for all your design needs.

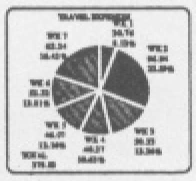
For C-64 **£24.95**
For C-128 **£34.95**



Lightpen (optional) **£12.95**







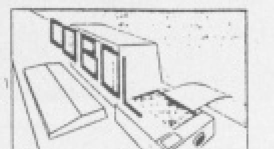
CHARTPAK
For C-64 or C-128

CHARTPAK lets you make professional quality charts *fast*—without any time-consuming programming. Enter, edit, save and recall your data, then interactively build your pie, bar, line chart or scatter graph. You specify scaling, labeling and positioning. CHARTPAK instantly draws the chart in any of 8 different formats—you can change your format immediately to draw another chart type. Other features include statistical routines for average, standard deviation, least squares and forecasting. You can also use data from spreadsheets such as Multiplan, Calc Result or Busicalc. CHARTPAK records your final results on Commodore 1525 / MPS-801/1526, Epson, Gemini, Okidata (including OKIMATE 10/color) or C Itoh Prowriter dot matrix printers.

C-64 version **£24.95** C-128 version **£34.95**

The C-64 versions work at 320×200 resolution and the C-128 versions at 600×360 resolution. CHARTPAK screens can be read by CADPAK for further enhancement if required.

COBOL
for the C-64 and C-128



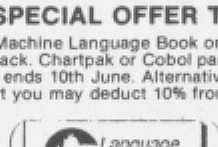
Now learn this universal business language on your Commodore 64 or Commodore 128!

COBOL is the most widespread business programming language in use today. Now you can run this easy-to-us, English-like language on your C-64 with the easy-to-learn COBOL System package. The COBOL System features a syntax-checking editor, interpreter, compiler, and a number of symbolic debugging aids; a crunch function to reduce the memory size of your programs; a print on/print off feature, and much more. Includes sample programs to help you learn as you go, as well as a complete 150-page manual.

Both versions on 1 disk **£34.95**

★★SPECIAL OFFER THIS MONTH★★:

free Machine Language Book or 5 blank disks or £5 discount off any Abacus book with every Cadpack, Chartpak or Cobol package purchased directly from Adamsoft. Please state choice. Offer ends 10th June. Alternatively if you purchase two or more software packages from this advert you may deduct 10% from the total cost.



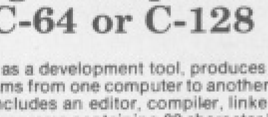
SUPER C
Language Compilers for C-64 or C-128

One of today's most popular languages, C is excellent as a development tool, produces 6502 machine code—and it's very easy to transport C programs from one computer to another. Our compiler makes full use of this versatile language; it includes an editor, compiler, linker and handbook. The powerful editor lets you create source programs containing 80 character lines, and features horizontal scrolling. Your source program can be up to 41K in length, 53K in object code. The linker lets you combine up to seven modules for later as a BASIC lookalike program. This really is a Super package.

★★SPECIAL OFFER★★

Both versions on 1 disk for only **£34.95** limited stocks at this price

SUPER Pascal
Development System for C-64 and C-128



SUPER Pascal is a complete development system for Commodore 64 and 128 computers. It implements the full Jensen & Wirth compiler plus extensions for graphics—and has a complete source file editor, a full assembler, and a comprehensive utility package. Our powerful program features high-precision 11-digit arithmetic; a very fast compiler; overlays; automatic loading of editor and source program; exact error messages and localization during compilation; complete statistics reporting; high speed DOS (3 times faster than the 1541's); free runtime package, and much more.

The 128 version supports 40 or 80 column mode. FAST or SLOW speed. Extra commands. RAM disk option, and 80 column hires graphics.

For C-64 **£34.95**
For C-128 **£44.95**

All software products are on disk.

Free postage on U.K. and overseas surface mail orders. Add £3 per item for airmail. We stock the entire range of Abacus software products and books. Send SAE for catalogue. Generous dealer terms available. Access (not VISA) or Transcash orders accepted (a/c 687944007). Add £1.50. Mail Order. Callers by appointment.

ADAMSOFT (Dept YC), 18 Norwich Avenue, Rochdale, Lancs OL11 5JZ
Tel: 0706-524304 (anytime)

---

commodore

COMMODORE – PC

All models include MS DOS, GW Basic, AGA Video Card, Serial & Parallel ports.

PC10 IBM-PC compatible 512K RAM, 2x360K floppy drive	£1095
PC20 IBM-AT compatible as above plus 20MB hard disk	£1495
PC40 IBM-XT compatible with 20 MB hard disk, 1 MB RAM, 1.5 MB floppy drive	£2395

ADD £200 FOR COLOUR MODELS
PC PRICES INCLUDE VAT, DELIVERY AND 1 YEAR ON-SITE MAINTENANCE

FROM £549! AMIGA

Amiga A500 with 512K RAM, 880K 3.5" disk, mouse, software	£549
Amiga A500M: As A500 above, plus A1081 RGB colour monitor	£825
Amiga A1000 with 512K RAM, 880K 3.5" disk, mouse, software	£725
Amiga A1000M: As above, plus A1081 RGB colour monitor	£995
Amiga A1000MF: As above, plus A1010 3.5" ext. disk drive	£1195
Amiga A2000 with 1MB RAM, 880K 3.5" disk, mouse, software	£1095
Amiga A2000M: As above, plus A1081 RGB colour monitor	£1395
Amiga A2000HD: As A2000, with internal 20MB hard disk	£Phone
Amiga A2020: As above, plus PC bridge board & floppy	£Phone

PRICES INCLUDE VAT, DELIVERY, AND 1 YEAR ON-SITE MAINTENANCE (1 YR WARRANTY ON A500 MODELS)

FREE GOLDEN KEY CARD!

with every 1000 or 2000 model Amiga... stay at over 200 top hotels as often as you like for a year, and for each night's stay, just pay for breakfast and dinner!

128 64C

Commodore 128D computer	£499
Commodore 128 computer	£249
NEW 512K expansion RAM	£149
Commodore 1571 disk drive	£269
MPS 1000 fast NLQ printer	£269
1901C colour monitor	£335
64C computer	£195
1541C disk drive	£195
64C Connoisseur Collection	£245

PRICES INCLUDE VAT, DELIVERY AND ONE YEAR WARRANTY. ADD £10 FOR OVERNIGHT DELIVERY

AMIGA PERIPHERALS

A2088 PC-XT bridge board with 5.25" internal floppy drive	£525
A2286 PC-AT bridge board with 5.25" internal floppy drive	£925
A5060 20MB internal hard disk with MS DOS controller	£525
A2090 20MB internal hard disk with Amiga DOS controller	£625
A2052 2MB internal RAM	£425
A2058 8MB internal RAM	£2245
A2010 3.5" internal disk drive	£195
A1010 3.5" external disk drive	£259
A1060 Sidecar PC compatible	£739
A1081 Amiga colour monitor	£335
A1050 add-in RAM 256K	£129
MegaBoard 2MB add-on RAM	£490
Xebec 10 MB hard disk	£995
Xebec 20 MB hard disk	£1095
Xerox 4020 colour printer	£1295
HP LaserJet laser printer	£2095
HP LaserJet Plus	£2995
Genlock video controller	£449
DigiView TV digitiser	£219
Cherry A3 Digitizing Tablet	£595
Easyl A4 Drawing Tablet	£449

C64 & 128 SOFTWARE

SuperBase 128	~~99.95~~	£57.95
SuperScript 128	~~89.95~~	64.95
VizaWrite 'Classic' 128	~~99.95~~	79.95
VizaStar 128	~~129.95~~	99.95
SwiftCalc 128	~~59.00~~	54.95
Data Manager 128	~~59.00~~	54.95
Word Writer 128	~~59.00~~	54.95
MicroClerk 128	~~99.99~~	94.95
Pocket Planner 128		49.95
SuperBase 64 & Plus/4	~~79.95~~	37.95
SuperScript 64	~~69.95~~	47.95
VizaWrite 64 'Professional'	~~59.95~~	39.95
VizaWrite 64 (cartridge)	~~89.95~~	69.95
VizaStar 64 XL8	~~99.95~~	79.95
VizaStar 64 XL4	~~79.95~~	69.95
SuperBase Starter 64	~~39.95~~	19.95
SuperBase: The Book		11.95
SuperType 64 (disk or tape)		14.95
Geos 64 v1.3		49.95
Simons Basic 64 (Cartridge)		39.95

SELECTED SOFTWARE FOR YOUR NEW AMIGA!

VizaWrite DeskTop		£149.95
SuperBase Personal	~~149.95~~	129.95
Page Setter	~~149.95~~	139.95
Logistix	~~281.75~~	154.95
Analyse	~~99.95~~	94.95
Scribble II	~~99.95~~	94.95
De Luxe Paint II	~~149.95~~	139.95
De Luxe Print / Video	~~99.95~~	84.95
De Luxe Music	~~99.95~~	94.95
True Basic	~~149.95~~	£139.95
True Basic libraries		49.95
MCC Pascal	~~89.95~~	84.95
A/C Fortran	~~295.00~~	284.95
Lattice C	~~129.95~~	124.95
Dynamic CAD	~~495.00~~	449.95
Aegis Draw Plus	~~299.00~~	284.95
Aegis Images	~~69.95~~	64.95
Aegis Animator	~~119.95~~	114.95

COMMODORE 128 and 64... PROGRAMMER'S CORNER

PetSpeed 128	The Basic 128 compiler, from Oxford Systems	~~49.95~~	£44.95
Super C 128	Complete C language, with extensions	~~59.95~~	44.95
Cobol 128	The complete COBOL package from Abacus		34.95
Hack Pack 128	All-in-one Programmer's Toolkit & Ram-Disk	~~39.95~~	36.95
RamDos 128	Lightning fast Ram-Disk for 512K expansion RAM		34.95
BrainBox IEEE	Supports PET/IEEE disks & printers etc. (128 or 64)		79.95
Anatomy of the 128	The 500 page insider's guide to the 128	~~12.95~~	11.95
Matrix 128	Run 64 programs on your 128 – in 128 mode!	~~49.95~~	44.95
PetSpeed 64	The standard 64 Basic compiler from Oxford	~~34.95~~	19.95
Oxford Pascal 64	The complete J & W Pascal for your 64	~~49.95~~	34.95
Oxford Pascal 64 (tape)	Pascal for 64 tape users, as above	~~22.95~~	19.95
Super C 64	Complete C language, with extensions	~~59.95~~	44.95
Cobol 64	The complete COBOL package from Abacus		34.95

Oxford BASIC 64

The ultimate utility pack for your 64... a full Programmer's Toolkit (FIND, DUMP, CHANGE, MERGE, RENUMBER) **plus ultra-fast Basic compiler plus program optimiser, analyser & compressor! £34.95**

Oxford PASCAL 128

A full J&W Pascal compiler with both interactive mode (90K user area) & disk compiler mode (120K)... graphics & sound extensions... and both stand-alone and modular run-time options! ~~49.95~~ **£44.95**

IF YOU WANT IT TOMORROW... CALL US TODAY! ON 01-546-7256

Prices are POST FREE & include VAT. Order by phone with your credit card, or send cheque/PO or your credit card number. Official orders welcome. We despatch same day by FIRST CLASS post. If our lines are busy, why not try our 24-hour recorded order service, on **01-541-5185.** Ref. A47

VISA

Calco Software

LAKESIDE HOUSE, KINGSTON HILL, SURREY, KT2 7QT. TEL 01-546-7256

W
writ
run
the
man
allo
run
step
regi
disp
accu
show
com
code
(inc
poi
run
spe
sto
poi
thro
fro
mad
$C0
$9F
mos
foll
by
$C1
$FI
$FI

Emulator 64

One problem with machine code programs is that once the initiating SYS call is entered, the outcome is in the lap of the gods. Emulator allows you to step through each individual instruction before you run the program.

By S.J. Branton

When any machine code program is written the chances are that it will not run the first time it is tried. When this is the case debugging can often take many hours.

Emulator is a 4K program which allows a machine code program to be run one instruction at a time. As each step is made, a display of all the registers is updated, including a display of the stack contents. The accumulator, x and y registers are also shown in bit form to aid fault finding.

Emulator has additional commands that allow skipping over code, changing of register values (including the status register and stack pointer), jumping into subroutines and running the program at a different speed with a trace displayed until a stop address is encountered, at which point the user can take over and step through any remaining code.

The program resides in memory from $7000 to $7FFF. As most machine code programs reside at $C000 and cartridges occupy $8000 to $9FFF, it was felt that this was the most convenient position for it.

It should be noted that the following Zero Page locations are used by the program:

$C1 and $C2 – Program counter
$FB and $FC – Temporary storage
$FD and $FE – Temporary storage

Getting It In

The emulator is presented in a form that uses our Hex Data Entry program. Please note that the Hex Data Entry program presented here is a new version for this program and the old one *MUST NOT* be used.

For detailed instructions on entering the program read the article accompanying the Hex Data program.

In Use

Once you have a completed version of the program SAVEd on to your disk or tape then LOAD it into the computer with:

LOAD "EMULATOR", 8, 1 for disk use
or
LOAD "EMULATOR", 1,1 if using cassette.

To start the emulator running, you must enter the following command:

SYS 28672,$XXXX

Where $XXXX is the start address of the machine code that you wish to test. e.g.

SYS 28672,$7000

would test the EMULATOR program itself.

Commands Available

F1 – STEP
The current address and subsequent disassembly are displayed in the top line under their headings. To step the program press F1, the registers will be updated and the new address will occupy the topline. The two previous lines will be scrolled down for reference.

F3 – SKIP
To ignore the current address and move to the next one, just press the F3 key.

F5 – ALTER REGISTER
Press F5 to alter the contents of any of the registers. A * will appear above the register header at which point a new value may be entered. Press RETURN to move to the next register and exit to Emulator.

F7 – GO JSR
This key allows the emulator to enter a subroutine at the current address and await its return, only if the current instruction is a JSR. Care must be taken when using this command since the Emulator relinquishes control during the subroutine, however it does have the advantage of stepping a lot of code. Use this command when jumping into subroutines of the C64's

ROM and it will save you from wading through screens full of code.

F8 – GO UNTIL

This is probably the most powerful command in the Emulator. Pressing F8 and then entering a start and stop address causes the code to be run from the start address but stop as soon as the end address is reached. The user may then use the F1 key etc. to step through remaining code.

It is possible to use GO UNTIL at three different speeds. Slow is best used if the program is being traced. Each time an instruction is carried out the border colour changes. If the border doesn't change then your program has crashed and you will have to reset your computer.

The last prompt with this command, allows the trace to be switched on or off. If Y is pressed, the hex address of the current location will be displayed in the upper left hand corner of the screen.

During GO UNTIL the P key may be used to freeze the emulation. Releasing the K key will allow the program to continue. RUN/STOP will return the program to the main screen, as will any invalid instruction encountered by the Emulator.

YC

EMULATOR PROGRAM

```
7000 4C EA 7A 3F 3F 3F 41 44 :26
7008 43 41 4E 44 41 53 4C 42 :22
7010 43 43 42 43 53 42 45 51 :41
7018 42 49 54 42 4D 49 42 4E :65
7020 45 42 50 4C 42 52 4B 42 :5C
7028 56 43 42 56 53 43 4C 43 :7F
7030 43 4C 44 43 4C 49 43 4C :4A
7038 56 43 4D 50 43 50 58 43 :EA
7040 50 59 44 45 43 44 45 58 :AC
7048 44 45 59 45 4F 52 49 4E :1B
7050 43 49 4E 58 49 4E 59 4A :6F
7058 4D 50 4A 53 52 4C 44 41 :B5
7060 4C 44 58 4C 44 59 4C 53 :82
7068 52 4E 4F 50 4F 52 41 50 :41
7070 48 41 50 48 50 50 4C 41 :D6
7078 50 4C 50 52 4F 4C 52 4F :A1
7080 52 52 54 49 52 54 53 53 :05
7088 42 43 53 45 43 53 45 44 :A1
7090 53 45 49 53 54 41 53 54 :A3
7098 58 53 54 59 54 41 58 54 :28
70A0 41 59 54 53 58 54 58 41 :FB
70A8 54 58 53 54 59 41 3F 3F :E9
70B0 3F 0A 00 18 D8 58 B8 CA :03
70B8 88 E8 C8 4A EA 48 08 68 :4A
70C0 28 2A 6A 40 60 38 F8 78 :32
70C8 AA A8 BA 8A 9A 98 69 65 :B1
70D0 75 61 71 29 25 35 21 31 :64
70D8 06 16 90 B0 F0 24 30 D0 :D2
70E0 10 50 70 C9 C5 D5 C1 D1 :AA
70E8 E0 E4 C0 C4 C6 D6 49 45 :E9
70F0 55 41 51 E6 F6 A9 A5 B5 :41
70F8 A1 B1 A2 A6 B6 A0 A4 B4 :E3
7100 46 56 09 05 15 01 11 26 :37
7108 36 66 76 E9 E5 F5 E1 F1 :F6
7110 85 95 81 91 86 96 84 94 :E4
7118 6D 7D 79 2D 3D 39 0E 1E :77
7120 2C CD DD D9 EC CC CE DE :D7
7128 4D 5D 59 EE FE 4C 6C 20 :A4
7130 AD BD B9 AE BE AC BC 4E :8C
7138 5E 0D 1D 19 2E 3E 6E 7E :B7
7140 ED FD F9 8D 9D 99 8E 8C :2F
7148 FF 03 0B 0E 0F 10 11 16 :78
7150 17 1A 1B 21 22 24 25 26 :25
7158 27 28 29 2A 2B 2D 2E 2F :91
7160 33 34 35 36 37 38 01 01 :E4
7168 01 01 01 02 02 02 02 02 :AA
7170 03 03 04 05 06 07 08 09 :61
7178 0A 0C 0D 12 12 12 12 12 :DD
7180 13 13 14 14 15 15 18 18 :94
7188 18 18 18 19 19 1E 1E 1E :6F
7190 1E 1E 1F 1F 1F 20 20 20 :FE
7198 21 21 23 23 23 23 23 28 :A6
71A0 28 29 29 2C 2C 2C 2C 2C :BD
71A8 30 30 30 30 1F 31 32 32 :37
71B0 01 01 01 02 02 02 03 03 :01
71B8 07 12 12 12 13 14 15 15 :73
71C0 18 18 18 19 19 1C 1C 1D :85
71C8 1E 1E 1E 1F 1F 20 20 21 :3B
71D0 21 23 23 23 28 28 29 29 :4B
71D8 2C 2C 2C 30 30 30 31 32 :97
71E0 00 09 09 09 09 09 09 09 :1B
71E8 09 09 09 09 09 09 09 09 :2C
71F0 09 09 09 09 09 09 09 09 :34
71F8 09 09 09 09 09 09 00 01 :BD
7200 02 07 08 00 01 02 07 08 :AA
7208 01 02 0A 0A 0A 01 0A 0A :21
7210 0A 0A 0A 00 01 02 07 08 :CE
7218 00 01 00 01 01 02 00 01 :37
7220 02 07 08 01 02 00 01 02 :6D
7228 07 08 00 01 03 00 01 02 :69
7230 01 02 00 01 02 07 08 01 :AD
7238 02 01 02 00 01 02 07 08 :C4
7240 01 02 07 08 01 03 01 02 :A8
7248 04 05 06 04 05 06 04 05 :F9
7250 04 04 05 06 04 04 04 05 :F3
7258 04 05 06 04 05 04 11 04 :50
7260 04 05 06 04 06 04 05 04 :09
7268 05 04 05 06 04 05 04 05 :12
7270 04 05 06 04 05 06 04 04 :19
7278 09 00 00 1D 67 A0 00 B1 :40
7280 C1 D9 B1 70 F0 07 C8 C0 :18
7288 97 F0 12 D0 F4 98 8D 4B :FC
7290 7B A0 02 D9 7A 72 B0 0D :FE
7298 88 D0 FB F0 08 A0 97 8C :D1
72A0 4B 7B A0 FF C8 C8 8C 7F :21
72A8 77 CE 7F 77 8C 4A 7B A0 :E9
72B0 00 B1 C1 20 2A 74 8C 4D :9B
72B8 7B A9 20 20 D2 FF AC 4D :95
72C0 7B C8 CC 4A 7B F0 02 D0 :EC
72C8 E8 A9 03 A0 1E 20 8C 78 :75
72D0 AC 4B 7B B9 49 71 8D 4C :B5
72D8 7B 0A 18 6D 4C 7B A8 B9 :21
72E0 03 70 8C 4D 7B 20 D2 FF :78
72E8 AC 4D 7B C8 B9 03 70 8C :DE
72F0 4D 7B 20 D2 FF AC 4D 79 :D1
72F8 C8 B9 03 70 20 D2 FF AC :E0
7300 4B 7B B9 E1 71 4C 4A 73 :8B
7308 A9 24 20 D2 FF A0 01 B1 :EB
7310 C1 4C 2A 74 A9 2C 20 D2 :7C
7318 FF A9 58 4C D2 FF A9 2C :B4
7320 20 D2 FF A9 59 4C D2 FF :C0
7328 A9 24 20 D2 FF A0 02 B1 :12
7330 C1 8C 4B 7B 20 2A 74 AC :FE
7338 4B 7B 88 B1 C1 4C 2A 74 :28
7340 A9 28 4C D2 FF A9 29 4C :D5
7348 D2 FF C9 00 D0 08 A9 23 :6A
7350 20 D2 FF 4C 08 73 C9 01 :A2
7358 D0 03 4C 08 73 C9 02 D0 :B5
7360 06 20 08 73 4C 14 73 C9 :EB
7368 03 D0 06 20 08 73 4C 1E :7B
7370 73 C9 04 D0 03 4C 28 73 :48
7378 C9 05 D0 06 20 28 73 4C :EB
7380 14 73 C9 06 D0 06 20 28 :41
7388 73 4C 1E 73 C9 07 D0 0C :E0
7390 20 40 73 20 08 73 20 14 :63
7398 73 4C 45 73 C9 08 D0 0C :6B
73A0 20 40 73 20 08 73 20 45 :FB
73A8 73 4C 1E 73 C9 09 D0 0A :FC
73B0 A9 20 A2 06 20 D2 FF CA :6C
73B8 10 FA C9 11 D0 09 20 40 :81
73C0 73 20 28 73 4C 45 73 C9 :3E
73C8 0A D0 55 A5 C1 8D 21 74 :9F
73D0 A5 C2 8D 22 74 A9 24 20 :5E
73D8 D2 FF A0 01 B1 C1 C9 80 :06
73E0 B0 0E 6D 21 74 8D 21 74 :90
73E8 90 03 EE 22 74 4C 06 74 :A6
73F0 49 FF AA E8 8E 4A 7B AD :1C
73F8 21 74 38 ED 4A 7B 8D 21 :94
7400 74 B0 03 CE 22 74 AD 21 :3A
7408 74 18 69 02 8D 21 74 90 :22
7410 03 EE 22 74 AD 22 74 20 :7E
7418 2A 74 AD 21 74 4C 2A 74 :87
7420 60 00 00 A5 C2 20 2A 74 :64
7428 A5 C1 48 4A 4A 4A 4A 20 :83
7430 42 74 AA 68 29 0F 20 42 :0F
7438 74 48 8A 20 D2 FF 68 4C :A6
7440 D2 FF 09 30 C9 3A 90 02 :34
7448 69 06 60 A9 20 20 D2 FF :97
7450 CA D0 F8 60 12 20 50 43 :84
7458 20 20 53 52 20 41 43 20 :F4
7460 58 52 20 59 52 20 53 50 :3F
7468 20 20 20 43 4F 44 45 20 :3A
7470 20 20 20 20 41 53 53 4C :8C
7478 41 4E 47 20 20 92 53 56 :AB
7480 2D 42 44 49 5A 43 A9 06 :44
7488 8D 21 D0 A9 05 8D 20 D0 :32
7490 A9 01 8D 86 02 A9 13 20 :7F
7498 D2 FF A9 0D 20 D2 FF A2 :2C
74A0 00 BD 54 74 20 D2 FF E8 :AB
74A8 E0 2A D0 F5 A9 0D 4C D2 :5F
74B0 FF A2 00 AD 0F 75 18 0A :A8
74B8 A8 90 07 A9 31 20 D2 FF :A4
74C0 D0 05 A9 30 20 D2 FF E8 :1A
74C8 98 E0 08 D0 E9 60 8D 10 :A0
74D0 75 8E 11 75 8C 12 75 08 :03
74D8 68 8D 0F 75 60 AD 0F 75 :5A
74E0 20 2A 74 A9 20 20 D2 FF :6A
74E8 AD 10 75 20 2A 74 A9 20 :BD
74F0 20 D2 FF AD 11 75 20 2A :A8
74F8 74 A9 20 20 D2 FF AD 12 :FD
7500 75 20 2A 74 A9 20 20 D2 :80
7508 FF AD 13 75 4C 2A 74 00 :12
7510 00 00 00 00 20 86 74 20 :00
7518 23 74 A9 20 20 D2 FF 20 :23
7520 DD 74 A9 20 20 D2 FF 20 :E5
7528 D2 FF 4C 7D 72 A9 08 A0 :38
7530 12 20 8C 78 A0 00 B9 7E :25
7538 74 20 D2 FF C8 C0 08 D0 :7E
7540 F5 A9 09 A0 12 20 8C 78 :D0
7548 4C B1 74 A2 08 BD 00 05 :98
7550 9D 28 05 CA D0 F7 60 A2 :FE
7558 00 8A 9D B1 7D E8 D0 FA :68
7560 60 AC 7F 77 60 A0 00 B1 :99
7568 C1 C9 48 D0 10 AE 13 75 :64
7570 AD 10 75 9D B1 7D CA 8E :69
7578 13 75 4C 5F 7A C9 08 D0 :A5
7580 10 AE 13 75 AD 0F 75 9D :CF
7588 B1 7D CA 8E 13 75 4C 5F :F2
7590 7A C9 68 D0 10 AE 13 75 :A5
7598 E8 BD B1 7D 8E 13 75 8D :D4
75A0 10 75 4C 5F 7A C9 28 D0 :AA
75A8 10 AE 13 75 E8 BD B1 7D :D6
75B0 8E 13 75 8D 0F 75 4C 5F :0C
75B8 7A C9 60 D0 19 AE 13 75 :E2
75C0 E8 BD B1 7D A8 E8 BD B1 :94
75C8 7D 8E 13 75 AA C8 D0 01 :28
75D0 E8 84 C1 86 C2 60 C9 20 :A4
75D8 D0 2A AE 13 75 A5 C2 9D :AF
75E0 B1 7D CA A5 C1 18 69 02 :C1
75E8 9D B1 7D 90 05 E8 FE B1 :A1
75F0 7D CA CA 8E 13 75 A0 01 :1C
75F8 B1 C1 48 C8 B1 C1 85 C2 :D1
7600 68 85 C1 60 C9 4C D0 0E :0A
```

cation will
left hand

P key may
emulation.
allow the
STOP will
ain screen,
nstruction
or.

YC

```
D 21 :94
D 21 :3A
4 90 :22
4 20 :7E
A 74 :87
A 74 :64
A 20 :B3
0 42 :0F
3 4C :A6
0 02 :34
2 FF :97
0 43 :B4
3 20 :F4
3 50 :3F
5 20 :3A
3 4C :8C
3 56 :AB
3 06 :44
0 D0 :32
3 20 :7F
F A2 :2C
F E8 :AB
C D2 :5F
3 0A :A8
2 FF :A4
F E8 :1A
D 10 :A0
5 08 :03
F 75 :5A
2 FF :6A
3 20 :BD
3 2A :A8
D 12 :FD
0 D2 :80
4 00 :12
4 20 :00
F 20 :23
F 20 :E5
3 A0 :38
3 7E :25
3 D0 :7E
C 78 :D0
0 05 :98
D A2 :FE
0 FA :68
0 B1 :99
3 75 :64
A 8E :69
3 D0 :A5
5 9D :CF
C 5F :F2
3 75 :A5
5 8D :D4
3 D0 :AA
1 7D :D6
C 5F :0C
3 75 :E2
0 B1 :94
0 01 :28
3 20 :A4
2 9D :AF
3 02 :C1
E B1 :A1
0 01 :1C
5 C2 :D1
0 0E :0A
```

```
7608 A0 01 B1 C1 48 C8 B1 C1 :B8
7610 85 C2 68 85 C1 60 C9 6C :49
7618 D0 16 A0 01 B1 C1 85 FB :6E
7620 C8 B1 C1 85 FC 88 B1 FB :6C
7628 85 C2 88 B1 FB 85 C1 60 :D9
7630 C9 00 D0 32 AE 13 75 A5 :64
7638 C1 18 69 02 48 90 02 E6 :72
7640 C2 A5 C2 9D B1 7D CA 68 :2F
7648 9D B1 7D CA AD 0F 75 09 :1C
7650 10 8D 0F 75 9D B1 7D CA :6D
7658 8E 13 75 AD FE FF 85 C1 :BA
7660 AD FF FF 85 C2 60 A0 00 :86
7668 B1 C1 D9 76 76 F0 0F C8 :95
7670 C0 08 D0 F6 F0 53 90 B0 :9A
7678 F0 30 D0 10 50 70 8D 87 :BB
7680 76 08 AD 0F 75 48 28 90 :DA
7688 0D 28 A9 02 18 65 C1 85 :2D
7690 C1 90 02 E6 C2 60 28 A0 :31
7698 01 B1 C1 C9 80 B0 0B 65 :77
76A0 C1 85 C1 90 02 E6 C2 4C :0A
76A8 BD 76 49 FF AA E8 8E 4A :1C
76B0 7B A5 C1 38 ED 4A 7B 85 :7A
76B8 C1 B0 02 C6 C2 A5 C1 18 :A6
76C0 69 02 85 C1 90 02 E6 C2 :F6
76C8 60 C9 40 D0 16 AE 13 75 :69
76D0 E8 BD B1 7D 8D 0F 75 E8 :C7
76D8 BD B1 7D 85 C1 E8 BD B1 :6A
76E0 7D 85 C2 4C 2C 7A 48 4A :DD
76E8 4A 4A 4A 18 69 30 C9 39 :78
76F0 90 04 F0 02 E9 39 AA 68 :29
76F8 29 0F 18 69 30 C9 39 90 :E0
7700 04 F0 02 E9 39 60 A9 05 :B2
7708 85 FC A9 60 85 FB A9 08 :5A
7710 8D 4A 7B AE 13 75 CA CA :4D
7718 BD B1 7D 86 FD 20 E6 76 :71
7720 A0 01 91 FB 8A 88 91 FB :12
7728 18 A9 28 65 FB 85 FB 90 :00
7730 02 E6 FC A6 FD E8 CE 4A :DD
7738 7B D0 DD A9 D9 85 FC A9 :15
7740 60 85 FB A2 08 A9 01 A0 :48
7748 01 91 FB 88 10 FB 18 A5 :7E
7750 FB 69 28 85 FB 90 02 E6 :2E
7758 FC CA E0 06 B0 E7 A9 07 :51
7760 E0 00 D0 E3 60 A9 60 8D :1A
7768 80 77 8D 81 77 8D 82 77 :68
7770 8D 83 77 20 61 75 B1 C1 :6A
7778 99 80 77 88 10 F8 60 00 :56
7780 00 00 00 00 20 73 00 C9 :1A
7788 24 D0 1F A0 01 98 48 20 :B6
7798 7B 20 C0 77 0D 4A 7B AA :19
77A0 68 A8 8A 99 58 7C 88 10 :32
77A8 E4 60 A2 0B 20 37 A4 00 :C4
77B0 30 31 32 33 34 35 36 37 :18
77B8 38 39 41 42 43 44 45 46 :27
77C0 20 73 00 A2 0F DD B0 77 :4F
77C8 F0 03 CA D0 F8 8A 60 20 :10
77D0 12 41 43 20 37 36 35 34 :17
77D8 33 32 31 30 92 20 20 20 :3C
77E0 20 20 20 20 53 54 41 54 :1E
77E8 55 53 20 20 20 20 20 53 :9B
77F0 54 41 43 4B 20 12 58 52 :BF
77F8 20 37 36 35 34 33 32 31 :18
7800 30 92 20 20 12 59 52 20 :E2
7808 37 36 35 34 33 32 31 30 :1C
7810 92 20 20 20 20 20 20 20 :02
7818 36 35 30 32 20 45 4D 55 :11
7820 4C 41 54 4F 52 20 31 32 :67
7828 38 36 34 43 38 36 20 20 :B0
7830 20 53 2E 4A 2E 42 52 41 :60
7838 4E 54 4F 4E 20 20 46 31 :25
7840 20 20 20 46 33 20 20 20 :B7
7848 20 46 35 20 20 20 20 20 :53
7850 46 37 20 20 20 20 3C 58 :A8
7858 3E 20 20 20 20 20 46 38 :C0
7860 20 20 20 20 20 53 54 45 :A6
7868 50 20 53 4B 49 50 20 41 :52
7870 4C 54 52 45 47 20 47 4F :FA
7878 2D 4A 53 52 20 45 58 49 :68
7880 54 21 20 47 4F 2D 55 4E :EE
7888 54 49 4C 20 85 D6 84 D3 :A3
7890 4C 6C E5 A9 07 A0 00 20 :EA
7898 8C 78 A0 00 B9 CF 77 20 :AC
78A0 D2 FF C8 C0 25 D0 F5 A9 :5C
78A8 0C A0 00 20 8C 78 A0 00 :60
78B0 B9 F4 77 20 D2 FF C8 C0 :C2
78B8 0F D0 F5 A9 11 A0 00 20 :FF
78C0 8C 78 A0 00 B9 03 78 20 :13
78C8 D2 FF C8 C0 28 D0 F5 A9 :93
78D0 13 A0 14 20 8C 78 A0 00 :CB
78D8 B9 2B 78 20 D2 FF C8 C0 :5B
78E0 11 D0 F5 A9 17 A0 00 20 :47
78E8 8C 78 A0 00 B9 3C 78 20 :91
78F0 D2 FF C8 C0 26 D0 F5 A9 :B1
78F8 18 A0 00 20 8C 78 A0 00 :BC
7900 B9 64 78 20 D2 FF C8 C0 :F5
7908 27 D0 F5 A9 13 85 D3 85 :BC
7910 D6 4C 6C E5 18 A0 00 0A :DE
7918 AA 90 04 A9 31 D0 02 A9 :BD
7920 30 91 FB 8A C8 C0 08 D0 :AB
7928 EE A0 00 18 A9 D4 65 FC :9E
7930 85 FC A9 01 91 FB C8 C0 :DB
7938 08 D0 F9 60 A9 05 85 FC :39
7940 A9 44 85 FB AD 10 75 20 :E0
7948 14 79 A9 06 85 FC A9 0C :E1
7950 85 FB AD 11 75 20 14 79 :73
7958 A9 06 85 FC A9 D4 85 FB :4C
7960 AD 12 75 4C 14 79 53 50 :BF
7968 20 3E A9 0A A0 1C 20 8C :2F
7970 78 A0 00 B9 66 79 20 D2 :50
7978 FF C8 C0 04 D0 F5 60 A0 :C5
7980 50 B9 78 04 99 A0 04 88 :D3
7988 10 F7 A9 00 99 78 D8 C8 :76
7990 C0 78 D0 F8 60 A0 00 B9 :F8
7998 6C 05 99 94 05 B9 44 05 :9C
79A0 99 6C 05 B9 34 06 99 5C :3B
79A8 06 B9 0C 06 99 34 06 B9 :83
79B0 FC 06 99 24 07 B9 D4 06 :88
79B8 99 FC 06 A9 01 99 6C D9 :56
79C0 99 94 D9 99 34 DA 99 5C :9F
79C8 DA 99 FC DA 99 24 DB C8 :42
79D0 C0 08 D0 C3 60 20 CE 7C :3E
79D8 C9 85 D0 12 A9 80 8D 0F :03
79E0 D4 20 3F 7B AD 97 04 C9 :EC
79E8 3F F0 07 4C 65 75 C9 86 :B2
79F0 D0 0B A9 40 8D 0F D4 20 :B8
79F8 3F 7B 4C 43 7A C9 87 D0 :66
7A00 06 20 67 7A 4C D5 79 C9 :74
7A08 88 D0 1A A0 00 B1 C1 C9 :B3
7A10 20 D0 C2 A9 20 8D 0F D4 :B1
7A18 20 3F 7B 4C 2C 7A C9 58 :4E
7A20 D0 B3 4C E2 FC C9 8C D0 :B8
7A28 F5 4C 4E 7B 20 65 77 AD :32
7A30 0F 75 48 AE 11 75 AC 12 :10
7A38 75 AD 10 75 28 20 80 77 :CB
7A40 20 CE 74 20 61 75 18 C8 :63
7A48 98 65 C1 85 C1 90 02 E6 :64
7A50 C2 60 A0 00 A9 20 99 78 :AE
7A58 04 C8 C0 28 D0 FB 60 18 :0C
7A60 E6 C1 90 02 E6 C2 60 A2 :3A
7A68 00 A0 05 A9 2A 99 00 04 :E3
7A70 A9 01 99 00 D8 86 57 84 :C3
7A78 58 20 C2 7A 90 FB A6 57 :32
7A80 A4 58 C9 FF D0 0F A9 20 :34
7A88 99 00 04 E8 C8 C8 C8 C0 :DD
7A90 12 B0 2E D0 D6 48 BD 0F :4D
7A98 75 0A 0A 0A 0A 8D 4A 7B :C5
7AA0 68 0D 4A 7B 9D 0F 75 86 :BA
7AA8 57 84 58 A9 03 A0 05 20 :A5
7AB0 8C 78 20 DD 74 20 3C 79 :70
7AB8 20 2D 75 A6 57 A4 58 D0 :9C
7AC0 B8 60 20 CE 7C 18 C9 2F :C3
7AC8 90 08 C9 3A B0 04 29 0F :CA
7AD0 38 60 18 C9 40 90 0B C9 :69
7AD8 47 B0 07 18 29 0F 69 09 :42
7AE0 38 60 C9 0D F0 01 18 A9 :0D
7AE8 FF 60 20 84 77 AD 58 7C :C0
7AF0 85 C1 AD 59 7C 85 C2 A9 :82
7AF8 FF 8D 13 75 20 57 75 20 :FB
7B00 26 78 20 44 E5 20 14 75 :F9
7B08 20 93 78 20 3C 79 20 06 :48
7B10 77 20 6A 79 20 2D 75 20 :CA
7B18 D5 79 20 7F 79 20 95 79 :33
7B20 20 52 7A 4C 05 7B A9 81 :24
7B28 8D 0E D4 A9 0F 8D 18 D4 :D2
7B30 A9 80 8D 0F D4 A9 88 8D :F6
7B38 13 D4 A9 88 8D 14 D4 A9 :5B
7B40 11 8D 12 D4 A9 10 8D 12 :09
7B48 D4 60 00 00 00 00 20 44 :DC
7B50 E5 A9 02 A0 05 20 8C 78 :7A
7B58 A0 00 B9 18 7C 20 D2 FF :65
7B60 C8 C0 12 D0 F5 20 9F 7C :E0
7B68 AD 58 7C 85 C1 AD 59 7C :6F
7B70 85 C2 A9 06 A0 05 20 8C :0A
7B78 78 A0 00 B9 2A 7C 20 D2 :3E
7B80 FF C8 C0 12 D0 F5 20 9F :3D
7B88 7C AD 58 7C 8D 3B 7C AD :45
7B90 59 7C 8D 3C 7C 20 5A 7C :FA
7B98 90 B4 20 05 7D 20 7F 7D :96
7BA0 20 44 E5 AD 7E 7D F0 03 :B7
7BA8 20 44 7D A2 FF A0 FF E8 :43
7BB0 EC 04 7D D0 FA C8 CC 04 :A1
7BB8 7D D0 F4 A0 00 B1 C1 D9 :66
7BC0 B1 70 F0 07 C8 C0 97 F0 :46
7BC8 12 D0 F4 98 8D 4B 7B A0 :96
7BD0 02 D9 7A 72 B0 0D 88 D0 :B0
7BD8 F8 F0 08 A0 97 8C 4B 7B :68
7BE0 A0 FF C8 C8 8C 7F 77 CE :5D
7BE8 7F 77 8C 4A 7B AD 4B 7B :7B
7BF0 C9 97 D0 03 4C 3D 7C 20 :B1
7BF8 65 75 EE 20 D0 A5 C1 CD :2E
7C00 3B 7C D0 07 A5 C2 CD 3C :FF
7C08 7C F0 E9 A5 C5 C9 3F F0 :7B
7C10 2C C9 29 F0 F6 4C A3 7B :EC
7C18 12 53 54 41 52 54 20 41 :4A
7C20 44 44 52 45 53 53 20 3A :37
7C28 92 24 12 53 54 4F 50 20 :32
7C30 41 44 44 52 45 53 53 20 :9D
7C38 3A 92 24 00 00 A9 05 8D :83
7C40 20 D0 20 44 E5 60 60 EA :19
7C48 20 CE 7C 48 20 C5 7A 68 :6C
7C50 90 F6 C9 0D F0 F2 60 00 :57
7C58 00 00 A9 10 A0 00 20 8C :F3
7C60 78 A0 00 B9 78 7C 20 D2 :AC
7C68 FF C8 C0 28 D0 F5 20 CE :F5
7C70 7C 38 C9 2A F0 01 18 60 :BD
7C78 49 46 20 41 4C 4C 20 49 :1D
7C80 53 20 4F 4B 20 50 52 45 :12
7C88 53 53 20 2A 2C 20 4F 54 :EE
7C90 48 45 52 57 49 53 45 20 :F6
7C98 50 52 45 53 53 20 5F A0 :9F
7CA0 01 98 48 20 47 7C 20 D2 :E4
7CA8 FF 20 C3 77 0A 0A 0A 0A :10
7CB0 8D 4A 7B 20 47 7C 20 D2 :7D
7CB8 FF 20 C3 77 0D 4A 7B 8D :DE
7CC0 4A 7B 68 A8 AD 4A 7B 99 :1A
7CC8 58 7C 88 10 D4 60 20 E4 :54
7CD0 FF D0 FB 20 E4 FF F0 FB :B6
7CD8 60 53 4D 46 FF 80 00 53 :70
7CE0 50 45 45 44 3A 2D 12 53 :DF
7CE8 92 4C 4F 57 20 20 20 20 :9B
7CF0 20 12 4D 92 45 44 49 55 :FB
7CF8 4D 20 20 20 20 20 12 46 :73
7D00 92 41 53 54 00 20 44 E5 :21
7D08 A9 0A A0 10 20 8C 78 A2 :25
7D10 00 BD DF 7C 20 D2 FF E8 :DC
7D18 E0 07 D0 F5 A9 0C A0 07 :77
7D20 20 8C 78 A2 00 BD E6 7C :E0
7D28 20 D2 FF E8 E0 1E D0 F5 :F5
7D30 20 CE 7C A2 03 CA 30 F8 :C3
7D38 DD D9 7C D0 F8 BD DC 7C :A5
7D40 8D 04 7D 60 A2 00 A9 24 :B5
7D48 20 75 7D E8 A5 C2 48 20 :26
7D50 67 7D 68 29 0F E8 20 6B :80
7D58 7D A5 C1 48 E8 20 67 7D :83
7D60 68 29 0F E8 4C 6B 7D 4A :A0
7D68 4A 4A 4A 18 69 30 C9 3A :00
7D70 90 03 38 E9 39 9D 00 04 :3D
7D78 A9 01 9D 00 D8 60 00 20 :72
7D80 44 E5 A9 0A A0 0F 20 8C :6B
7D88 78 A2 00 BD A8 7D 20 D2 :DE
7D90 FF E8 E0 09 D0 F5 20 CE :41
7D98 7C A2 01 C9 59 F0 05 C9 :47
7DA0 4E D0 F3 CA 8E 7E 7D 60 :B4
7DA8 54 52 41 43 45 20 59 2F :6F
7DB0 4E 00 00 00 00 00 00 FF :F6
```

Smart Lister

Make your listings look smarter and cleaner with this clever little program.

By Gregory Murphy

I have often thought that the appearance of a program listing is not at all enhanced by the inherent inclusion of the READY prompt which immediately follows the last line of the program. Also, when listing long programs I usually find that the last line on each page is neatly bisected by the row of perforations on the continuous stationery! The following Basic program was written to overcome both of the above problems.

Program Description

The program allows the user to specify the beginning and end of the range of program lines to be printed, the size of the continuous stationery being used (in terms of the number of lines per page) and the maximum number of printed lines which may appear on each page. Default values for each of the above options are displayed on the screen, and may be used (by simply pressing RETURN) or altered by overtyping as required.

How It Works

All prompt messages are disabled by means of the POKE instructions in line 63979, thereby ensuring that the READY message is not printed at the end of the program listing.

The program operates by scanning the Basic link addresses and associated line numbers until the line corresponding to the start of the required has been found. The program then counts forward n lines (where n represents the maximum number of lines that may be printed on each page) and determines the number of the line appearing at that point.

A nice feature is that the program does not calculate the number of lines to be printed from the values of the line numbers involved, but actually counts the lines themselves. This means that programs written (either by choice or through lack of a RENUMBER facility) with irregularly incremented line numbers can be listed without difficulty.

The program then clears the screen, displays a LIST command to the printer for enough lines to fill one printed page and then stops At least it would stop if instructions had not been previously poked into the keyboard buffer (line 63994)! These instructions home the cursor and enter RETURN, thereby executing the previously displayed LIST command to the printer.

At this stage the program should also stop, but there are still further instructions in the keyboard buffer. These instructions ensure that the program will GOTO line 63996 and continue the scanning, counting and printing process until all of the required range of lines has been printed.

When printing is complete, the program re-enables all prompts, clears the printer buffer and then terminates.

Important Note

It should be noted that lines 63983, 63986 and 63989 contain a capital letter "O" (not a zero) in the expressions "g063996" and "g063998" – i.e. GOTO 63996 and GOTO 63998 respectively.

In Use

First enter the program as shown and then save it either to disk or tape before attempting to run it. This is always a good precaution to take with any program, but is especially necessary in the case of a program containing either SYS or POKE instructions.

Load the program for which a listing is to be printed and then append this program to it. Obviously the last line number in the program to be listed must not exceed 63959, but in an extreme situation the REM statements in lines 63960 to 63969 could be omitted and the default value of L2 altered to 63969 in line 63973.

The simplest way to append this program is as follows:

Enter the command POKE 43, (45)-2: POKE 44, PEEK (46) in direct mode.
Load this program.
Enter the command POKE 43, 1 : POKE 44, 8 in direct mode.

PROGRAM: PAGED LISTER

```
21  63960 rem# *****************
    ***********
ed  63961 rem  *
              *
d8  63962 rem  *  paged program
    listings  *
ef  63963 rem  *
              *
05  63964 rem  * == gregory m. m
    urphy. == *
e9  63965 rem  *
              *
87  63966 rem  *     2 december
    1986      *
eb  63967 rem  *
              *
0e  63968 rem  *****************
    ***********
e0  63969 :
d3  63970 poke53280,14:poke53281
    ,6:print"[white]"chr$(14):de
    ffna(x)=peek(x)+peek(x+1)*25
    6
e6  63971 :
a9  63972 input"[clr,down2]  [sl
    ]ist from line no. ? [sb]egi
    nning[left11]";l$:l1=val(l$)
4b  63973 input"[down2,spc9]to l
    ine no. ? [se]nd[left5]";l$:
    l2=val(l$):ifl2=0thenl2=6395
    9
d0  63974 input"[down2]  [st]ota
    l lines/page[spc3]? 70[left4
    ]";tl
74  63975 input"[down2]  [sp]rin
    ted lines/page ? 64[left4]";
    pl
2d  63976 print"[down3]  [so].[s
    k]. to print (y/n)?"
55  63977 getyn$:ifyn$=""then639
    77
b4  63978 ifyn$<>"y"then63972
c0  63979 open1,4,7:poke768,131:
    poke769,164:sk=tl-pl-2:i=43
df  63980 :
e0  63981 k=fna(fna(i)+2):ifk<l1
    theni=fna(i):goto63981
dd  63982 :
c2  63983 gg$="[home]"+chr$(13)+
    "g[so]63996"+chr$(13)
68  63984 n=1
f4  63985 i=fna(i):ifi<>0then639
    88
c0  63986 gg$="[home]"+chr$(13)+
    "g[so]63998"+chr$(13):li=639
    98:goto63993
d6  63987 :
a8  63988 li=fna(i+2):ifli<l2the
    n63991
28  63989 gg$="[home]"+chr$(13)+
    "g[so]63998"+chr$(13):li=l2:
    goto63993
d5  63990 :
af  63991 n=n+1:ifn<=plthen63985
cb  63992 :
e6  63993 print"[clr]cmd1:list"l
    1"-"li:fort=1tolen(gg$)
23  63994 poke630+t,asc(mid$(gg$
    ,t,1)):next:poke198,len(gg$)
    :end
ce  63995 :
89  63996 l1=li+1:fors=1tosk:pri
    nt#1:next:goto63984
cc  63997 :
b2  63998 poke768,139:poke769,22
    7:print#1:close1:end
```

This program will now be appended to the program to be listed, and may be run by entering the command RUN 63970.

If printing is aborted by means of the RUN/STOP button, the simplest method of returning things to normal is to enter the command GOTO 63998 in direct mode. This re-enables prompts and clears the printer buffer. The resulting "File not open error" message may be ignored. YC

Printer Control

Will this word processor from McGowan be just what your printer has been waiting for?

By Evelyn Mills

Printer Control is a word processor which has most of the facilities associated with other good word processors i.e. line deletion, block deletion, copying and transfer, editing, page numbering, centering, file linking, disk handling, justification and so forth. Apart from such generalised techniques however, other facilities exist which enhance word processing.

Before discussing these, it should be noted that this review is for the disk system handling the MPS801/803 printers only. Systems for other printers are also available and the package comes with a generalised Manual plus amendment data for the printer which you are using. The amendment pages for the MPS series must be examined with due care.

Files

The first thing you will no doubt wish to do is create a file. The Main Menu provides the necessary options, including one for adjusting the speed of the cursor control. Select the requisite option and follow the manual plus the amendment section. Reference to pages 12-15 in the General Manual will help you here. While the commands are relatively simple and are mostly achieved through the function keys some facts are rather elusive.

Pay particular attention to the F1 key when initialising a document. This is your escape key for quitting commands. Any formatting errors are highlighted at the bottom of the screen as numbers 1-6 which can be tracked down in the Manual which is indexed to cover the major features of processing.

Effectively it is possible to increase the size of text print within a document (by a two, four or eight scale) and also to underline text. The latter facility is not east to locate (in its simplest form). However, it may be done in the following manner — press F5, write text, press F6. In the Manual, these are defined as 'condense on' and 'condense off' which are bypassed on the MPS801/803. It is certainly not possible to obtain 'condensed' or 'double density' text with this program (unless you redesign the character set with the Graphics Editor) but these keys will underline for you although the Manual does not describe this facility. A more complicated method is provided.

Other Commands

The RUN-STOP key allows you to back-step very efficiently. Should you run into problems, save as you go along which will allow you to do a further search for the solution in the manual(s). Editing is simple, using I for insertion and D for delete.

Use of the Commodore key allows you to toggle between text and graphics mode in your document. This, of course, eliminates use of the graphics using this key. The shift key is fully functional. As you use the program more and more you will no doubt find the methods best suited to your own needs.

Summing Up

To summarise. In text mode, you may, within the text itself, enhance text size, underline, position at right, left or centre, save to disk and output to printer. Page numbering, form feed and multiple page printing are also possible while very specialised instructions for string handling are provided.

The other standard facilities of processors are, of course, present. To supplement this, use the PICTURE MODE and do as much free-hand drawing on screen as you wish using the keyboard graphics. This is readily handled, the cursor acting in a 'wrap around' fashion. Again the Commodore key allows section between graphics and text; this is an entertaining mode and your printer may be scrolled up, down, left or right changed to inverse video, and reversed in the horizontal planes. Text may be inserted anywhere on the screen and erasing is best effected by using the space-bar in the graphics mode.

You can make really entertaining headings here for bulletins, A4 posters etc. The screen is 24 line by 40 columns which may be modified to print part of your picture working on a 8 x 8 block size. Printer output may be in 1/2/4/8 expansion output on the X or Y axes.

Redefining graphics is fairly standard and is described in full, as are printer output functions and screen dumps. While the General Manual is fairly extensive, please refer to the amendment supplement to find out what may or may not be possible on the MPS801/803.

As a word processor, the package is average, but the addition of the facilities described give it an added attraction. At a cost of £30 on disk or £25 on tape, the decision is yours.

Procedures

Programming in Basic can be very long winded and clumsy. Using procedures can make your program much cleaner and smoother.

By Nick Gregory

Good programs, so the old story goes, are those which are easily read and thus properly constructed. This philosophy certainly makes writing them a lot quicker and the end product is easier to understand.

However, it is very difficult to achieve this in Basic because even the best end result is only a program full of REM annotated subroutines. In the end, you are left with code consisting of a mass of GOSUBs which are very difficult to follow.

The Solution

Procedures offer a very neat way around this problem by allowing you to write your program in readily understood segments. Each procedure is in effect a mini-program all of its own. The implications of this are that several mini-programs can be put together and then called by name from the main program.

For example a small program to ask for a name, and then print a message could look like this:

```
10 DEFPROC ASK NAME(A$)
20 INPUT "WHAT IS YOUR
NAME"; A$
30 END
40:
50 DEFPROC PRINT MESS-
AGE(A$)
60 PRINT "HELLO"; A$
70 END
80:
90 PROC ASK NAME(NAME$)
100 PROC PRINT MESSAGE
(NAME$)
```

In this example the actual program starts at line 90 and ends at line 100 because any lines between DEFPROC and END are ignored when you type RUN. Notice how the procedures are called by their names. The name of any variable associated with the procedures (NAME$ in this case) is called something different at the start of the procedure. This type of syntax allows you to read the program (lines 90 and 100 demonstrate how easy this is) and to use the same procedure with different associated variables (though variables are optional).

The routine PROC.LOAD is a Basic loader for the machine code, necessary to implement procedures on the 64. As always, type the program and SAVE it before running in case there are errors.

The machine code section, PROC.CODE, of the program should be entered using the program HEX DATE ENTRY II. Do not use the earlier version of this program. For details on how to enter this code refer to the article Hex Data Entry II. When you have finished entering all the data you should SAVE it with the name 'PROC.CODE'. If using tape this should be placed after 'PROC.LOAD'.

To use the program in future simply LOAD and RUN the program 'PROC.LOAD', this will automatically LOAD and execute the machine code.

The machine code will now be incorporated into the Basic interpreter and you can continue to use the 64 as normal.

The routine works by wedging into the Basic command interpreter and not into the GETCHARACTER subroutine as is normal. However, to avoid changing the LIST and CRUNCH Basic routines each new command begins with the character '@'. There are three new commands:

@DEFPROC

@DEFPROC – name of procedure (optional parameters)

This command is used to define the start of a procedure. The procedure name can be any length up to 127 characters long and SPACES ARE SIGNIFICANT so the names GET A NAME and GETANAME are recognised as being two different procedures.

This is unusual but I felt it allows the names to make more sense. Note that a space between the last character and the parameter bracket, ')', is also significant. The procedure name can contain any Basic key word, e.g. PRINT, in which case the appropriate abbreviation can be used. The optional parameter list can contain any number of parameters, separated by commas, within a limit which I will explain later.

The variables can be strings, integers or floating point numbers but they cannot be arrays, expressions or numbers. The only other restriction is that you can not use SYSTEM variables (ST, TI, or TI$) in the parameter list.

For example see Table 1:

The @ DEFPROC and @ END commands behave like REM statements towards any instructions after them on the same line; that is to say they are ignored.

@ END

This command marks the end of a procedure. You must always use @ END after using @ DEFPROC.

@ PROC procedure name (optional paremeters)

This command is used to call a procedure (like GOSUB is used to call a subroutine). There must be a procedure defined by @ DEFPROC with the same name. If you are using parameters then they must be of the same type, in the same order and the same number as in the @ DEFPROC command. @ PROC is just an ordinary Basic command, you can for example include it as part of a multi-statement line. If, however, you are using it after an IF command then put a colon between the THEN and @ PROC. For example:

Table 1

@DEPROC PRINT	OK
@DEFPROC PRINT (A,B%,C$)	OK
@DEFPROC PRINT (12)	ILLEGAL
@DEFPROC PRINT (A*B,C)	ILLEGAL
@DEFPROC PRINT (ST,TI$)	ILLEGAL

PROGRAM: PROC.CODE

```
C000 78 A9 00 8D B0 C2 A9 1C :79
C008 8D 08 03 A9 C0 8D 09 03 :B7
C010 A9 46 8D 00 03 A9 C0 8D :99
C018 01 03 58 60 20 73 00 08 :39
C020 C9 40 F0 04 28 4C E7 A7 :62
C028 28 A9 A7 48 A9 E9 48 20 :72
C030 73 00 C9 96 F0 34 C9 50 :3D
C038 F0 6A C9 80 D0 03 4C 44 :AD
C040 C2 A2 0B 6C 00 03 A0 00 :89
C048 8A 30 06 8C B0 C2 4C 8B :DC
C050 E3 29 7F F0 F9 8C B0 C2 :C7
C058 38 E9 01 0A AA BD B1 C2 :34
C060 85 22 BD B2 C2 85 23 4C :65
C068 47 A4 20 A6 B3 20 73 00 :53
C070 20 2C C2 A2 81 86 A9 A2 :0E
C078 80 86 AA 20 81 C0 4C 3B :73
C080 A9 20 3B A9 A0 02 A6 A9 :BC
C088 B1 7A F0 B7 A0 04 20 FB :C9
C090 A8 20 73 00 C9 3A F0 F9 :72
C098 C9 40 D0 E5 20 73 00 C5 :5F
C0A0 AA D0 DE 60 20 2C C2 F0 :7A
C0A8 98 20 11 C2 A0 82 84 A9 :CB
C0B0 A0 96 84 AA 86 AB A5 7A :A3
C0B8 85 9B A5 7B 85 9C 20 8E :DF
C0C0 A6 20 81 C0 20 73 00 20 :7B
C0C8 2C C2 20 11 C2 E4 AB D0 :6B
C0D0 F0 A4 AB B1 7A D1 9B D0 :D2
C0D8 E8 88 10 F7 E6 AB A4 AB :30
C0E0 20 FB A8 A6 7A A4 7B A5 :45
C0E8 9B 85 7A 86 9B A5 9C 85 :64
C0F0 7B 84 9C A4 AB 20 FB A8 :0B
C0F8 AD B0 C2 48 A0 00 84 A8 :67
C100 B1 7A F0 53 C9 3A F0 4F :12
C108 A9 28 20 FF AE 20 8B B0 :D0
C110 A2 03 A5 0D 30 06 CA A5 :9D
C118 0E 30 01 CA 8A 20 83 C2 :C8
C120 A2 83 A5 48 C5 30 90 09 :0B
C128 A5 47 C5 2F 90 03 4C 43 :74
C130 C0 38 A5 47 E9 02 20 83 :FC
C138 C2 A5 48 E9 00 20 83 C2 :25
C140 A5 45 20 83 C2 A5 46 20 :6D
C148 83 C2 E6 A8 A0 00 A9 2C :C0
C150 D1 7A F0 B6 20 F7 AE A5 :11
C158 7A 20 83 C2 A5 7B 20 83 :B6
C160 C2 A5 A8 20 83 C2 68 20 :D7
C168 83 C2 A5 9B 85 7A A5 9C :A2
C170 85 7B A6 A8 B1 7A C9 28 :8D
C178 F0 06 8A D0 1A 4C 3B A9 :81
C180 8A F0 14 AE B0 C2 CA BD :48
C188 F7 C2 AA 84 A9 84 AA 20 :1C
C190 73 00 20 13 B1 B0 03 4C :B9
C198 41 C0 85 A9 20 73 00 90 :5E
C1A0 05 20 13 B1 90 0C 85 AA :ED
C1A8 20 73 00 90 FB 20 13 B1 :A2
C1B0 B0 F6 A0 03 C9 24 F0 10 :0D
C1B8 88 C9 25 F0 0B 88 C9 2C :47
C1C0 F0 09 C9 29 F0 05 D0 CF :B7
C1C8 20 73 00 98 DD F7 C2 D0 :17
C1D0 3B BD F8 C2 85 9B BD F9 :A3
C1D8 C2 85 9C A0 00 BD FA C2 :4C
C1E0 29 80 05 A9 91 9B C8 BD :93
C1E8 FB C2 29 80 05 AA 91 9B :C6
C1F0 8A 18 69 05 AA 88 C6 A8 :25
C1F8 A9 2C D1 7A D0 04 A5 A8 :3F
C200 D0 89 A5 A8 D0 91 20 F7 :7F
C208 AE 4C 3B A9 A2 16 4C 43 :7D
C210 C0 A2 FF A0 FF C8 B1 7A :E3
C218 F0 0B C9 28 F0 07 C9 3A :42
C220 F0 03 E8 10 F0 E0 FF D0 :77
C228 59 4C 41 C0 A0 FF C8 B1 :F6
C230 7A D9 40 C2 D0 F3 C0 03 :3E
C238 90 F4 20 FB A8 4C 73 00 :31
C240 50 52 4F 43 20 A6 B3 20 :96
C248 98 C2 AA 20 98 C2 F0 22 :06
C250 85 A8 BD F8 C2 85 9B BD :49
C258 F9 C2 85 9C A0 00 BD FA :EF
C260 C2 91 9B C8 BD FB C2 91 :9E
C268 9B 8A 18 69 05 AA C6 A8 :C2
C270 D0 E0 BD F7 C2 85 7A BD :39
C278 F8 C2 85 7B BD FA C2 8D :B2
C280 B0 C2 60 8E AF C2 AE B0 :45
C288 C2 9D F7 C2 E8 F0 1B 08 :96
C290 8E B0 C2 AE AF C2 28 60 :8B
C298 8E AF C2 AE B0 C2 CA BD :EC
C2A0 F7 C2 08 E0 FF D0 E9 A2 :FD
C2A8 84 2C A2 10 4C 43 C0 00 :F8
C2B0 00 B9 C2 C6 C2 D6 C2 E6 :CC
C2B8 C2 4E 4F 20 40 45 4E 44 :A3
C2C0 20 46 4F 55 4E C4 55 4E :8E
C2C8 44 45 46 2E 20 50 52 4F :56
C2D0 43 45 44 55 52 C5 49 4C :54
C2D8 4C 45 47 41 4C 20 56 41 :25
C2E0 52 49 41 42 4C C5 40 45 :91
C2E8 4E 44 20 57 49 54 48 4F :4F
C2F0 55 54 20 50 52 4F C3 00 :56
C2F8 00 00 00 00 00 00 00 00 :F8
```

Please read LISTINGS before entering this program.

PROGRAM: PROC.LOADER

```
C7  1 PRINT"[CLR,DOWN2,RIGHT7]PR
    OCEDURES FOR CBM BASIC V2
D8  2 PRINT"[DOWN,RIGHT10]N.P GE
    REGORY  NOV '86
78  3 PRINT"[DOWN2,RIGHT6]COMMAN
    DS: @DEFPROC,@PROC,@END
55  4 REM INITIALISED BY SYS 491
    52
AA  5 IFA=1THENGOTO8
4F  6 D=PEEK(186):A=A+1
14  7 LOAD"PROC.CODE",8,1
65  8 SYS 49152:NEW
```

```
150 IF A >12 THEN: @ PROC
PRINT ERROR(ER)
```

This oddity is caused by the way the Basic interpreter processes the IF .. THEN commands.

Error Messages

All the Basic error messages are redirected via this routine so that the procedure stack is reset; unless it is a STOP, END or RUN/STOP in which case the program can be continued as normal.

Apart from the standard error messages three Basic errors have different meanings and there are three new messages.

Syntax Error

This will be caused if the parameters are not the same or you've spelt something wrong. It is usually quite obvious what the problem is.

Type Mismatch

This occurs if the variable in @DEFPROC isn't of the same type as in @PROC.

Out Of Memory

This will occur if you have no more room to store the parameter information. Each procedure uses four bytes of a buffer plus five bytes for every parameter. The buffer is 256 bytes long so you can have a maximum of 28 procedures active in a program if there is just one parameter each. Procedures use their own buffer throughout so you can still have the normal amount of FOR .. NEXT and GOSUB .. RETURN loops in your program. Procedure with more than one parameter will use that much more space though you shouldn't have any problems.

NO @ END FOUND

This means that @DEFPROC has not got an associated @ END. This can be tricky to debug because the @END is looked for but doesn't pair it specifically with any @ DEFPROC. This error will occur if there isn't the same number of @ ENDS to @DEFPROC. Remember, always close procedures with @ END.

UNDEF. PROCEDURE

No @ DEFPROC name can be paired with a procedure call. Check spelling and parameter list.

ILLEGAL VARIABLE

This error occurs if you try to use array variables (a(n)) as a parameter.

@END WITHOUT PROC

This error occurs if the program meets an @ END when it isn't inside a procedure. This is similar to RETURN WITHOUT GOSUB ERROR.

It is important that you note that the @ DEFPROC command, when called from @ PROC, is checked before BASIC is told what line the @DEFPROC is on. If there is an error caused while checking @DEFPROC the error will be reported as having occured in the line with @PROC.

In Use

You can use procedures to do almost anything within a program. For example a small procedure to incorporate a delay into a program can be written as:

```
100 @ DEFPROC WAIT(N)
110 TI$="000000"
120 IF INT(TI/60) < N THEN 120
130 @ END
```

This procedure can now be called by @PROC WAIT(SECONDS) where SECONDS is given by any value you please. A similar procedure can be written to wait for a key press. For example:

```
200 @ DEFPROC PRESS SPACE
BAR
210 PRINT "PRESS SPACE BAR TO
CONTINUE"
220 GET A$:IF A$ <> CHR$(32)
THEN 220
230 @ END
```

These two routines could be called in succession as:

```
500 SECONDS=5
510 @ PROC WAIT(SECONDS)
520 @ PROC PRESS SPACE BAR
530 REM rest of program
```

You should now have a reasonable idea of how procedures can be used within your program to make the whole code that much more readable and easier to debug. The last thing I want to cover is a brief description of what's going on within the 64 and how this imposes one severe restriction on this implementation of Basic procedures.

When the @ PROC command is encountered a check is made to see if there are any parameters associated with the procedure. If there are none there's no problem and the program branches into the appropriate @DEFPROC.

If, however, there are parameters, they are checked off in turn and their name is kept on the special procedure stack. When the parameter list is checked at the @ DEFPROC command the new variable name is put into the 'variable name' bytes within the Basic VARIABLE space (immediately after the Basic program). This is how a different variable name is assigned to the same value and why SYSTEM variables, expressions and arrays cannot be used (because they are not stored in this space).

When the @ END statement is reached the original variable name is replaced. The advantage of this is that procedures can be used as multi-line functions, for example:

```
10 @ DEFPROC CONVERT TO
BINARY(A,A$)
20 :A$=""
30 :FOR J=7 TO 0 STEP-1
40 :A$=A$+MID$("01",SGN(A
AND 2↑J)+1,1)
50 :NEXT J
60 @ END
```

This procedure converts a decimal number to binary number which is returned from the procedure in the string variable. It could be called by a line such as:

```
100 @ PROC CONVERT TO
BINARY(DECIMAL,BINARY$)
```

The disadvantage is that because the variable value is changed it is impossible to set up recursive procedures.

It could be legitimately argued that recurssion is the great advantage of procedures but I think even without this facility procedures on the 64 will make your programs that much better.

USA Today

What the American software user is buying this spring, and lots of news on the Amiga. It's all here.

By Lewis Tilley

Are you British computer game players like your US counterparts? A recent magazine survey here investigated several thousand readers to arrive at a profile of those who played games. Some of the results were surprising, some not.

Polling Day

Over three quarters of them were males, which one would expect, but more than half of these men were over 20 years old. A majority of these had owned their computer for at least two years.

Family Computing is a "generic" computing magazine with a pronounced bias toward Apples, but Commodore accounted for 30% of the computers used, Apples 28% and the IBM PC (and compatibles) 24%.

$20 to $30 games were purchased most often. Although a game price of $35 to $50 dollars didn't deter 28% of the buyers. More than *50 for a game? All but 2% said "Forget it!". 3% said that they never bought games. How reassuring that there are so few pirates.

Game playing seems to be an 81% alternative to viewing the television. David Hallerman, the collater of this information, was encouraged to find that only 8%, of those who replied to the questionaire, had given up time formerly spent in study.

What type of games appeal most? Arcade and Arcade/Strategy were the top two. They outranked the Political/Military/Strategy (the lowest of nine categories) by two to one. And, now for the winners! The top ten game choices are: *Zork I,II, and III, Ultima II, III, and IV, Flight Simulator II, King's Quest I and II, One on One, Simmer Games I and II, Lode Runner, Hitchkiker's Guide Galaxy, Jet, Pac Man.* Yeah, *Pac Man!*

US computer game players are hooked on flight programs. In addition to *Simulator II*, which can teach you how to really fly (and now offers nine extra Scenery disks of places to fly), there is *Jet, Super Huey II, Infiltrator, A.C.E., Spitfire 40, Stunt Flyer, Ace of Aces, Dam Busters* and five simulators of combat flying by Strategic Simulations, Inc. MicroPose, alone, offers *AcroJet, F-15 Strike Eagle, Kennedy Approach* (an air controller's traffic game), *Solo Flight* and *Top Gunner.*

All of the above are available for the C 64. VC20 owners can get it on the fun with MicroProse's *Top Gunner.*

The great news is Amiga's version of *Flight Simulator II.* Ben Dunnington, INFO magazine's publisher and editor, says, "BEGIN your (Amiga) game collection with this one!". He also gives his ***** (five star) rating to another new Amiga release *Chessmaster 2000* by Electronic Arts/Software Toolworks. Although the 64 version of *Chessmaster* is just another good chess program, the Amiga version comes very close to real chess pieces (in your choice of wood or metal, 2D or 3D seen from the front or side) and more features than you've ever had from a live teacher. My favourite feature is the key you press when "the boss is coming".

Marble Madness, also Electronic Arts, for the Amiga is far superior to its C64 little brother. MC, who didn't care for it in her review in *Your Commodore* should try it on the office Amiga.

My "office Amiga" is now one month old. When I can escape from *Chessmaster 2000* and *Marble Madness*, I am totally ensnared in the two programs which led me to purchase the Amiga. I find myself using both *Aegis Images* and *Deluxe Paint II* to work on the same graphic since they share IFF files. *Deluxe Paint II* is much the more powerful program, but Aegis' pattern making tricks are irrestible.

Add a *Digi-View Video Digitizer* from NewTek, used with a Panasonic CCTV camera model WV 1410, for visual input to the Amiga in IFF files, and you would get as excited as I am about the Amiga. Alas, both *Aegis Images* and *Deluxe Paint II* with their IFF files can only work with 32 colors produced by the *Digi-View* although *Digi-View* shows you their H.A.M. "hold-and-modify" mode to display 4096 colors at the same time on the screen. A new Digi-Paint software program will soon be available from NewTek to manipulate the 4096 mode in H.A.M. It will cost £59.95 and requires an update software version 2.0.

The Amiga is getting a 1.2 *Kickstart* and *Workbench* update, but deliveries through local dealers has been delayed.

Scribbles! is the best of the presently available word processors for the Amiga. It was developed by Micro-Systems Software and is sold by Brown-Wagh Publishing. Version 2.0 is now out. Amiga *WordPerfect* is promised for this spring. This program for the IBM-PC is presently the hot word software with the Blue bunch. Let's hope it sells cheaper than $495 in

its Amiga version for it sound like just what all US column writers need.

Your *Superbase Personal* has been written from the 64 to the Amiga and brought over here. It's said that you can file IFF graphics and CAD drawings to be used within text layouts. The same Progressive Peripherals and Software who handle *Logistix*, a project and time management type spreadsheet, sell the *Superbase*. Batteries included finally got their 128 *Paperclip* wordprocessor to the market place, RUN magazine said flatly, "...best professional word processor available." It has a built-in telecommunications system in addition to a spellcheck and dictionary. Cost is $79.95. There is no sign of *Paperclip* Elite which will integrate text and graphics for the Amiga.

However, it is Amiga software that is inundating the market. What a great answer to the old put down still being used by their competitors that there is more software for Atari's ST. More news on Commodore's good health is revealed for its market value, when this was written, of 13.5 a share – up from last year's low of four.

Online communication seems to lend itself to gossip and rumors. Last months' chit-chat included talk of a production end for the C128 so more 64Cs could be made and of a reduced cost Amiga under $500. Let's hope the C128 will hang in there. At least a third of the members of my local Commodore Club converted to the 128 within three months of its arrival on the market, and they are very satisfied with it. Still, if the Amiga could get down to $500, with a disk dirve? Oh, heck, they'd change again!

Touchline

Spitfire 40, Gulf Strike: *Avalon Hill Micro Games, 4517 Harford Road, Baltimore, MD 21214.*

Stunt Flyer: *Sierra On-Line, 48677 Victoria Lane, Oakhurst, CA 94644.*

Ace of Aces, Dam Busters: *Accolade Inc., 20833 Stevens Creek Blvd., Cupertino, CA 95014.*

Acrojet, F-15 Strike Eagle, Kennedy Approach, Solo Flight and Top Gunner: *MicroProse, 120 Lakefront Drive, Hunt Valley, MD 21030.*

Chessmaster 2000, Marble Madness, Deluxe Paint II: *Electronic Arts, P.O. Box 7530 SanMateo, CA 94403.*

Aegis Images: *Aegis Development, 221[illegible] Wiltshire Blvd. Santa Monica, CA 90403.*

Digi-View Video Digitizer, DIGI PAINT: *NewTek, Inc. 701 Jackson Topeka, KS, 66603.*

Scribble: *Brown-Wagh Publishing 16795 Lark Ave. Los Gatos, CA 9503[illegible]*

Family Computing: *730 Broadway New York, NY100003.*

Flight Simulator II, Jet, Scenery Disks *SubLogic Corp., 713 Edgebrook Drive Ghampaign, IL 61820.*

Super Huey II: *Cosmi Inc., 415 [illegible] Figueroa, Wilmington, CA 90744.*

Infiltrator: *Mindscape, 3444 Dundee Road, Northbrook, IL 60062.*

64 Source Generator

Ever wondered just how your favourite machine code program works? Now's your chance to find out with this powerful disassembler.

By Kevin Otton

A good disassembler is one of the most important tools in a programmer's arsenal. By using such a utility to examine programs, he can find out just how a certain programmer manages to scroll the screen so smoothly, or simply learn to improve his own coding.

64 Source Generator is a disassembler that goes a step further than ,most programs of this type. It actually provides a file which can be assembled.

If you have never come across a disassembler before the operation of one is quite simple. You tell the disassembler which area of the computer's memory you wish to examine. The computer then prints to your screen or printer a list of all the machine code instructions that are to be found in the area of memory specified.

This is all well and good, but what if it were to come across an instruction such as JSR $C010? With most disassemblers, it would take some time to find the actual location of $SC01.

64 Source Generator improves on this by actually putting labels within the programs to where any instruction jumps. This makes it much easier when trying to follow instructions of any program.

The file that Source Generator creates in memory can be manipulated in the same way as Basic program; LOAD, SAVE etc. And can be assembled with any assembler program that uses a standard Basic file structure. The extremely popular MIKRO assembler being an example.

Getting It All In

The program is presented in two parts.

The first program, SOURCE GEN, is simply a small Basic program that is used to actually LOAD and RUN the Source Gen program. This program should be typed in and Saved on to cassette or disk for use later.

The second program, S-GEN M/C, is presented in a form suitable for use with our updated Hex Data Entrt II program. Read the instructions accompanying this program for detailed information on how to use this program.

Once you have entered all of the S-GEN M/C program, save it out to your tape or disk. If you are using tape then the program should be SAVEd after the SOURCE GEN program.

Note: For your own programming safety make sure that you only use the *new* version of Hex Data Entry. Do not use the earlier version.

Using The Program

To use the program simply LOAD and RUN the SOURCE GEN program, this will automatically LOAD and RUN the program S-GEN M/C.

Once the program has started you will be presented with a choice of three numbers. These are options for the Source Gen program to start in memory. The possible numbers are:

1 – 828 (Cassette buffer)
2 – 704 (Sprite Use)
3 – 49152 (Free RAM)

Select whichever one of these you require. The numbers 828,704 and 49152 are the SYS numbers that you will need to activate the SOURCE program. The selection of the area to be used should be guided by where the program you are 'investigating' starts in memory, to avoid a clash with the generator.

Tape users should note that, as memory location 828 is the tape buffer, performing a SAVE or LOAD operation will corrupt the SOURCE-GEN program.

Once selection is made the program will be moved to the necessary area and you will be returned to Basic. Now type NEW to make sure that the memory is free for your disassembly. Typing SYS followed by the location of the SOURCE GEN program, e.g. SYS 49152, will cause the start up menu of the SOURCE GEN program to be presented. Most of the options available are self explanatory and a brief description of these should suffice.

F1) DISASSEMBLE

In order to disassemble, the program to be disassembled should have already been loaded into memory. If

necessary, the Move Basic option should be used before using this function.

You will be asked for a START ADDRESS, END ADDRESS, and a LINE NUMBER to start the disassembler working. If the line number is already in use the new program code will overwrite the original and following line numbers. Hitting RETURN with no line number entered will result in the computer working out the next line number+10 and adding it to the existing file.

RUN/STOP will abort the disassembly function but no error checking or correction takes place.

Extra long machine code programs may need disassembling in more than one part due to the limited memory available as the labels and source code are generated.

F2) RENUMBER

This is only suitable for use with program created by the Source Generator as it only renumbers the lines and not any GOTOs or GOSUBs etc.

F3) DELETE

This will delete all lines from the first and last specified inclusive.

F4) APPEND

Use this option to add additional parts to the program already in memory. Disk users must enter a filename.

F5) START/END ADDRESS

For DISK USERS ONLY — This function displays the start and end address of the specified disk program.

F6) ALTER START OF BASIC

This function is extremely useful if there is a possibility that your machine code source file may overwrite your machine code being examined. For example if your machine code program starts at S0801, the same place where a Basic program usually starts, and it ends at S11E0, the source code generated would overwrite your machine code. In this case you could use this function to move the start of Basic to say $2000 and you will suffer no such problems.

F7) EXIT TO BASIC

This quite simply returns you to the Basic READY prompt where you can LIST, LOAD, SAVE etc. the source code you have generated.

Numeric Input

When a numeric input is required it can be entered in either decimal or hexadecimal format. For a hexadecimal number then you should prefix the number by a $ sign e.g. $C000. YC

PROGRAM: SOURCE GEN

```
4C   5 Q=PEEK(186)
13   10 IFF=0THENF=1:LOAD"S-GEN M
     /C",Q,1
CF   20 POKE53281,6:POKE646,14:SY
     S49152
```

Use HEX DATA ENTRY II to enter this program.

PROGRAM: S-GEN M/C

```
A000 4C AF A0 4C 7F A2 4C 00 :15
A008 A0 A9 93 20 D2 FF 20 54 :C7
A010 A0 A9 00 85 FB A9 04 85 :37
A018 FC A0 00 A9 2A 91 FB C8 :4D
A020 C0 28 D0 F9 18 A5 FB 69 :FF
A028 28 85 FB A5 FC 69 00 85 :69
A030 FC C9 07 D0 12 A5 FB C9 :70
A038 C0 D0 0C A9 2A A0 00 91 :7A
A040 FB C8 C0 28 D0 F9 60 A0 :31
A048 00 A9 2A 91 FB A0 27 91 :9C
A050 FB 4C 24 A0 A2 00 AD 09 :FC
A058 A8 9D 00 D8 9D 00 D9 9D :82
A060 00 DA 9D 00 DB E8 E0 00 :C2
A068 D0 EC 60 20 09 A0 A2 00 :0B
A070 BD BB A6 9D 51 04 BD DD :C9
A078 A6 9D 79 04 BD FF A6 9D :F0
A080 C9 04 BD 25 A7 9D 19 05 :E4
A088 BD 4B A7 9D 69 05 BD 71 :22
A090 A7 9D B9 05 BD 97 A7 9D :64
A098 09 06 BD BD A7 9D 59 06 :68
A0A0 BD E3 A7 9D A9 06 E8 E0 :55
A0A8 24 F0 03 4C 70 A0 60 A9 :BD
A0B0 08 20 D2 FF A9 0E 20 D2 :7B
A0B8 FF A9 00 85 9D 20 6B A0 :DB
A0C0 20 E4 FF F0 FB C9 85 D0 :25
A0C8 03 4C FC A0 C9 89 D0 03 :C2
A0D0 4C 0B A1 C9 86 D0 03 4C :2C
A0D8 11 A1 C9 8A D0 03 4C 17 :9C
A0E0 A1 C9 87 D0 03 4C 1D A1 :92
A0E8 C9 8B D0 03 4C 23 A1 C9 :40
A0F0 88 D0 CD 4C 29 A1 A9 8E :51
A0F8 20 D2 FF 60 20 F6 A0 20 :FD
A100 40 AC 20 44 E5 20 7F A2 :CA
A108 4C AF A0 20 F6 A0 4C 4A :04
A110 A1 20 F6 A0 4C 47 A2 20 :E7
A118 F6 A0 4C 7A A5 20 F6 A0 :CD
A120 4C 2C AA 20 F6 A0 4C 65 :0C
A128 A9 20 F6 A0 4C 06 A0 20 :73
A130 E4 FF C9 20 F0 05 C9 03 :52
A138 F0 0B 60 20 E4 FF F0 FB :B4
A140 C9 03 F0 01 60 68 68 4C :6B
A148 AF A0 A9 2C 85 26 A9 A8 :3E
A150 85 27 20 48 BD 20 5B BD :79
A158 90 03 4C AF A0 20 01 BB :4D
A160 90 1B A5 5F 48 A5 60 48 :B7
A168 A9 59 85 26 A9 A8 85 27 :02
A170 20 48 BD 20 5B BD 90 08 :3C
A178 68 68 4C 5A A1 4C AA A6 :BF
A180 20 01 BB 90 F8 A0 01 B1 :3A
A188 5F AA 88 B1 5F A8 68 85 :62
A190 60 68 85 5F 98 A0 00 91 :0B
A198 5F C8 8A 91 5F C8 B1 5F :C3
A1A0 85 14 C8 B1 5F 85 15 A9 :3D
A1A8 00 8D 00 02 A2 B9 8E 00 :2C
A1B0 BC A2 A1 8E 01 BC 4C 45 :74
A1B8 BA A5 2B 85 61 A5 2C 85 :70
A1C0 62 A0 00 B1 61 C8 11 61 :3A
A1C8 F0 10 A0 00 B1 61 48 C8 :AB
A1D0 B1 61 85 62 68 85 61 4C :87
A1D8 C1 A1 A5 61 18 69 02 85 :72
A1E0 2D A5 62 69 00 85 2E 4C :E1
A1E8 AF A0 A9 7A 85 26 A9 A8 :16
A1F0 85 27 20 48 BD 20 5B BD :19
A1F8 B0 06 20 01 BB 4C 08 A2 :CF
A200 A5 2B 85 5F A5 2C 85 60 :EA
A208 A0 00 B1 5F C8 11 5F F0 :9E
A210 20 A0 02 AD 4F A9 91 5F :9A
A218 C8 AD 51 A9 91 5F 20 34 :60
A220 A2 A0 00 B1 5F 48 C8 B1 :51
A228 5F 85 60 68 85 5F 4C 08 :78
A230 A2 4C AF A0 AD 4F A9 18 :91
A238 6D 52 A9 8D 4F A9 AD 51 :3C
A240 A9 69 00 8D 51 A9 60 A9 :62
A248 98 85 26 A9 A8 85 27 20 :77
A250 48 BD 20 5B BD 90 03 4C :64
A258 AF A0 A5 14 8D 4F A9 A5 :E8
A260 15 8D 51 A9 A9 8F 85 26 :A0
A268 A9 A8 85 27 20 48 BD 20 :07
A270 5B BD B0 03 A5 14 2C A9 :8E
A278 0A 8D 52 A9 4C EA A1 20 :95
A280 C4 A4 18 20 81 A4 90 03 :B9
A288 4C AF A0 AD D5 A4 0D D6 :D2
A290 A4 F0 06 20 EE B2 4C 82 :9C
A298 A2 A5 FD 8D CF A4 A5 FE :05
A2A0 8D D0 A4 AD D3 A4 8D CD :A7
A2A8 A4 AD D4 A4 8D CE A4 AD :28
A2B0 CD A4 38 E9 01 8D CD A4 :1F
A2B8 AD CE A4 E9 00 8D CE A4 :A1
A2C0 20 C4 A4 18 20 81 A4 90 :56
A2C8 03 4C AF A2 AD D3 A4 CD :2F
A2D0 CD A4 D0 08 AD D4 A4 CD :B2
A2D8 CE A4 F0 06 20 EE B2 4C :48
A2E0 C3 A2 A9 01 8D 3C 03 AD :8C
A2E8 D5 A4 0D D6 A4 F0 C0 AD :00
A2F0 D5 A4 85 14 AD D6 A4 85 :F5
A2F8 15 AD D3 A4 85 FB AD D4 :46
A300 A4 85 FC A0 00 B1 FB 8D :8D
A308 D9 A4 AD D7 A4 0D D8 A4 :16
A310 F0 06 20 FD A3 4C 1B A3 :2C
A318 20 52 A4 A9 28 8D 00 BC :62
A320 A9 A3 8D 01 BC 4C 45 BA :E1
A328 A5 FB 18 69 01 85 FB 8D :17
A330 CD A4 A5 FC 69 00 85 FC :B4
A338 8D CE A4 A5 14 18 69 02 :C4
A340 85 14 A5 15 69 00 85 15 :88
A348 20 C4 A4 18 20 81 A4 90 :DE
A350 03 4C A7 A3 AD D3 A4 CD :A3
A358 CD A4 D0 08 AD D4 A4 CD :3A
A360 CE A4 F0 06 20 EE B2 4C :D0
A368 4B A3 AD D5 A4 0D D6 A4 :D0
A370 F0 03 4C 7F A2 20 E3 A3 :7D
A378 AD D3 A4 85 FB AD D4 A4 :AC
A380 85 FC A0 00 B1 FB 8D D9 :D7
```

```
A388 A4 AD D7 A4 0D D8 A4 F0 :E8
A390 06 20 FD A3 4C 9A A3 20 :E6
A398 52 A4 A9 28 8D 00 BC A9 :FA
A3A0 A3 8D 01 BC 4C 45 BA 78 :40
A3A8 A5 01 29 FD 85 01 A0 01 :C5
A3B0 B1 FD F0 06 20 EE B2 4C :B5
A3B8 B0 A3 A0 01 A5 FB 91 FD :8C
A3C0 C8 A5 FC 91 FD C8 A5 14 :CE
A3C8 91 FD C8 A5 15 91 FD A5 :21
A3D0 01 09 02 85 01 58 A0 00 :72
A3D8 B1 FB 8D D9 A4 20 52 A4 :DC
A3E0 4C 9A A3 78 A5 01 29 FD :6F
A3E8 85 01 A0 02 A5 14 91 FD :E7
A3F0 C8 A5 15 91 FD A5 01 09 :A3
A3F8 02 85 01 58 60 A9 4C 8D :B9
A400 00 02 AD D7 A4 8D 01 02 :00
A408 AE D8 A4 20 07 AF AD 83 :E2
A410 B4 8D 02 02 AD 82 B4 8D :AD
A418 03 02 AD 81 B4 8D 04 02 :28
A420 A9 20 8D 05 02 8D 09 02 :6B
A428 A9 42 8D 06 02 A9 59 8D :EB
A430 07 02 A9 54 8D 08 02 A9 :CD
A438 24 8D 0A 02 AD D9 A4 20 :8F
A440 C5 AD 8E 0B 02 8D 0C 02 :F1
A448 A9 00 8D 0D 02 A9 12 85 :72
A450 08 60 A9 42 8D 00 02 A9 :35
A458 59 8D 01 02 A9 54 8D 02 :06
A460 02 A9 20 8D 03 02 A9 24 :22
A468 8D 04 02 AD D9 A4 20 C5 :D4
A470 AD 8E 05 02 8C 06 02 A9 :86
A478 00 8D 07 02 A9 0C 85 0B :3F
A480 60 78 A5 01 29 FD 85 01 :29
A488 A0 01 B1 FD D0 03 4C BB :3F
A490 A4 8D D4 A4 88 B1 FD 8D :7B
A498 D3 A4 A0 02 B1 FD 8D D5 :81
A4A0 A4 C8 B1 FD 8D D6 A4 C8 :5C
A4A8 B1 FD 8D D7 A4 C8 B1 FD :F9
A4B0 8D D8 A4 A5 01 09 02 85 :DE
A4B8 01 58 60 A5 01 09 02 85 :8E
A4C0 01 58 38 60 A9 FA 85 FD :4D
A4C8 A9 FF 85 FE 60 00 00 00 :D6
A4D0 00 00 00 00 00 00 00 00 :D0
A4D8 00 00 00 8E 0B A8 A2 00 :A5
A4E0 A9 2E 20 D2 FF E8 EC 0B :C4
A4E8 A8 D0 F7 A2 00 A9 9D 20 :DE
A4F0 D2 FF E8 EC 0B A8 D0 F7 :B7
A4F8 A9 00 8D 50 A9 20 E4 FF :C9
A500 F0 FB C9 0D F0 2F C9 14 :5E
A508 F0 2C C9 20 90 EF C9 5B :EC
A510 B0 03 4C 1D A5 C9 C0 90 :CD
A518 E4 C9 DB B0 E0 AE 50 A9 :CB
A520 EC 0B A8 F0 D8 9D 53 A9 :4D
A528 20 D2 FF EE 50 A9 A9 00 :C6
A530 85 D4 4C FD A4 60 AD 50 :E4
A538 A9 F0 C2 CE 50 A9 A9 9D :4C
A540 20 D2 FF A9 2E 20 D2 FF :01
A548 A9 9D 20 D2 FF 4C FD A4 :A1
A550 A9 10 85 26 A9 A9 85 27 :5E
A558 20 48 BD A9 32 85 26 A9 :4D
A560 A9 85 27 20 48 BD 20 E4 :DE
A568 FF F0 FB C9 59 F0 09 C9 :40
A570 4E D0 F3 68 68 4C AF A0 :70
A578 38 60 A9 CB 85 26 A9 A8 :F3
A580 85 27 20 48 BD A2 10 20 :C0
A588 DB A4 A9 FA 85 26 A9 A8 :EA
A590 85 27 20 48 BD 20 E4 FF :88
A598 F0 FB C9 54 F0 0E C9 44 :CC
A5A0 D0 F3 AD 50 A9 F0 A9 A2 :39
A5A8 08 4C B3 A5 A9 0D 20 D2 :00
A5B0 FF A2 01 BE 0A A8 A0 00 :B0
A5B8 A9 01 20 BA FF AD 50 A9 :2C
A5C0 A2 53 A0 A9 20 BD FF A5 :BB
A5C8 2D 38 E9 02 AA A5 2E E9 :E2
A5D0 00 A8 A9 00 20 D5 FF B0 :32
A5D8 42 20 D4 BA A5 2D A4 2E :F1
A5E0 38 E9 02 85 57 98 E9 00 :A6
A5E8 85 58 A0 00 B1 57 C8 11 :7C
A5F0 57 F0 10 A0 00 B1 57 48 :9E
A5F8 C8 B1 57 85 58 68 85 57 :BE
A600 4C EA A5 A5 57 18 69 02 :D5
A608 85 2D 85 2F 85 31 A5 58 :34
A610 69 00 85 2E 85 30 85 32 :AC
A618 4C AF A0 AD 0A A8 C9 08 :37
A620 F0 11 A9 0E 85 26 A9 A8 :C1
A628 85 27 20 48 BD 20 5B A5 :91
A630 4C 7A A5 20 39 A6 4C 7A :C4
A638 A5 20 CC FF A9 0D 20 D2 :88
A640 FF 20 D2 FF A9 20 20 D2 :6E
A648 FF A9 00 20 BD FF A9 0F :DB
A650 A2 08 A0 0F 20 BA FF 20 :13
A658 C0 FF A2 0F 20 C6 FF A0 :75
A660 00 20 CF FF C9 0D F0 07 :0C
A668 99 54 AB C8 4C 61 A6 A9 :5E
A670 00 99 54 AB AD 54 AB C9 :98
A678 30 F0 03 4C 85 A6 AD 55 :A1
A680 AB C9 30 F0 23 A9 54 85 :26
A688 26 A9 AB 85 27 20 48 BD :78
A690 20 CC FF A2 0F 20 C9 FF :4F
A698 A9 49 20 D2 FF A9 13 20 :F1
A6A0 D2 FF 20 E7 FF 4C 5B A5 :D4
A6A8 18 60 A9 6A 85 26 A9 A8 :7F
A6B0 85 27 20 48 BD 20 5B A5 :19
A6B8 4C 4A A1 20 20 20 20 20 :3B
A6C0 20 20 20 20 20 20 20 20 :40
A6C8 20 20 20 4D 45 4E 55 20 :3C
A6D0 20 20 20 20 20 20 20 20 :50
A6D8 20 20 20 20 20 20 20 20 :58
A6E0 20 20 20 20 20 20 20 20 :60
A6E8 20 20 20 20 20 2D 2D 2D :79
A6F0 2D 20 20 20 20 20 20 20 :7D
A6F8 20 20 20 20 20 20 20 20 :78
A700 20 20 3C 31 3E 20 20 44 :CE
A708 49 53 41 53 53 45 4D 42 :6E
A710 4C 45 20 54 4F 20 4D 45 :24
A718 4D 4F 52 59 2E 2E 2E 2E :09
A720 46 31 20 20 20 20 20 20 :E8
A728 3C 32 3E 20 20 44 45 4C :7D
A730 45 54 45 20 4C 49 4E 45 :E8
A738 53 2E 2E 2E 2E 2E 2E 2E :D5
A740 2E 2E 2E 2E 2E 2E 46 32 :80
A748 20 20 20 20 20 20 3C 33 :24
A750 3E 20 20 52 45 4E 55 4D :5E
A758 42 45 52 2E 2E 2E 2E 2E :7E
A760 2E 2E 2E 2E 2E 2E 2E 2E :D8
A768 2E 2E 2E 2E 46 33 20 20 :A4
A770 20 20 20 20 3C 34 3E 20 :C6
A778 20 41 50 50 45 4E 44 2E :C3
A780 2E 2E 2E 2E 2E 2E 2E 2E :F8
A788 2E 2E 2E 2E 2E 2E 2E 2E :00
A790 2E 2E 46 34 20 20 20 20 :FC
A798 20 20 3C 35 3E 20 20 53 :EE
A7A0 54 41 52 54 20 41 44 44 :DE
A7A8 20 28 44 49 53 4B 29 2E :F8
A7B0 2E 2E 2E 2E 2E 2E 2E 2E :28
A7B8 46 35 20 20 20 20 20 20 :88
A7C0 3C 36 3E 20 20 41 4C 54 :7C
A7C8 45 52 20 53 54 41 52 54 :65
A7D0 20 4F 46 20 42 41 53 49 :3D
A7D8 43 2E 2E 2E 2E 2E 46 36 :4D
A7E0 20 20 20 20 20 20 3C 37 :DC
A7E8 3E 20 20 45 58 49 54 20 :94
A7F0 54 4F 20 42 41 53 49 43 :98
A7F8 2E 2E 2E 2E 2E 2E 2E 2E :70
A800 2E 2E 2E 2E 46 37 20 20 :54
A808 20 01 08 00 00 00 0D 0D :05
A810 20 54 41 50 45 20 4C 4F :80
A818 41 44 20 45 52 52 4F 52 :94
A820 00 53 54 41 52 54 20 41 :40
A828 44 44 20 00 93 0D 1D 1D :34
A830 1D 1D 1D 1D 1D 1D 1D 1D :44
A838 1D 1D 1D 1D 1D 12 44 45 :5B
A840 4C 45 54 45 20 52 54 4E :6E
A848 0D 0D 0D 20 44 45 4C 45 :44
A850 54 45 20 46 52 4F 4D 20 :35
A858 00 0D 0D 0D 20 44 45 4C :48
A860 45 54 45 20 54 4F 20 20 :FA
A868 20 00 0D 0D 0D 20 4E 4F :7E
A870 4C 49 4E 45 20 20 20 20 :8C
A878 20 00 0D 0D 0D 20 45 58 :97
A880 49 53 54 49 4E 47 20 4C :FF
A888 49 4E 45 20 4E 4F 00 0D :84
A890 0D 20 53 54 45 50 2D 00 :9A
A898 93 11 1D 1D 1D 1D 1D 1D :0A
A8A0 1D 1D 1D 1D 1D 1D 1D 1D :B4
A8A8 12 52 45 4E 55 4D 42 45 :D2
A8B0 52 20 52 54 4E 0D 0D 0D :1F
A8B8 0D 20 4E 45 57 20 4C 49 :D2
A8C0 4E 45 20 4E 55 4D 42 45 :9D
A8C8 52 20 00 93 11 1D 1D 1D :5C
A8D0 1D 1D 1D 1D 1D 1D 1D 1D :E4
A8D8 1D 1D 1D 1D 12 41 50 50 :8A
A8E0 45 4E 44 20 52 54 4E 0D :29
A8E8 0D 0D 20 45 4E 54 45 52 :74
A8F0 20 46 49 4C 45 4E 41 4D :03
A8F8 45 00 0D 0D 20 54 41 50 :77
A900 45 20 4F 52 20 44 49 53 :89
A908 48 20 28 54 2F 44 29 00 :FD
A910 0D 0D 20 46 49 4C 45 20 :C7
A918 4E 41 4D 45 20 4E 45 45 :62
A920 44 45 44 20 49 4E 20 44 :7B
A928 49 53 4B 20 4D 4F 44 45 :D7
A930 21 00 0D 0D 20 43 4F 4E :77
A938 54 49 4E 55 45 20 59 2F :5C
A940 4E 00 0D 0D 0D 20 4C 49 :46
A948 53 54 20 54 4F 20 00 00 :3E
A950 00 00 00 00 00 00 00 00 :50
A958 00 00 00 00 00 00 00 00 :58
A960 00 00 00 00 00 A9 CF 85 :27
A968 26 A9 A9 85 27 20 48 BD :52
A970 20 5B BD 90 03 4C AF A0 :5D
A978 A5 15 C9 08 90 E7 C9 70 :FB
A980 F0 05 B0 E1 4C BB A9 A5 :93
A988 14 D0 DA A5 14 85 2B A5 :35
A990 15 85 2C A9 00 A8 91 2B :16
A998 C8 91 2B A5 2B 18 69 02 :ED
A9A0 85 2D A5 2C 69 00 85 2E :3E
A9A8 20 65 BB 20 E7 FF A5 37 :FB
A9B0 A4 38 85 33 84 34 A5 2D :D6
A9B8 A4 2E 85 2F 84 30 85 31 :E2
A9C0 84 32 20 E2 BB A2 19 86 :E2
A9C8 16 4C AF A0 4C AF A0 93 :91
A9D0 0D 1D 1D 1D 1D 1D 1D 1D :D4
A9D8 1D 1D 12 4D 4F 56 45 20 :0B
A9E0 53 54 41 52 54 20 4F 46 :A3
A9E8 20 42 41 53 49 43 0D 0D :5D
A9F0 0D 0D 20 45 4E 54 45 52 :7C
A9F8 20 56 41 4C 55 45 20 42 :EE
AA00 45 54 57 45 45 4E 20 24 :33
AA08 30 38 30 30 2D 24 37 30 :B2
AA10 30 30 0D 0D 0D 0D 20 4E :DA
AA18 45 57 20 53 54 41 52 54 :BF
AA20 20 41 44 44 52 45 53 53 :B3
AA28 20 00 00 00 20 B7 FF A9 :73
AA30 85 85 26 A9 AB 85 27 20 :5B
AA38 48 BD A2 10 20 DB A4 AD :C6
AA40 50 A9 D0 03 4C AF A0 18 :14
AA48 A9 01 85 B8 A9 08 85 BA :52
AA50 A9 00 85 B9 AD 50 A9 85 :74
AA58 B7 A9 53 85 BB A9 A9 85 :D2
AA60 BC 20 C0 FF 20 39 A6 B0 :98
AA68 C3 A9 B5 85 26 A9 AB 85 :39
AA70 27 20 48 BD A2 01 20 C6 :E3
AA78 FF 20 CF FF 8D C7 AB 8D :A0
AA80 CA AB 85 14 20 CF FF 8D :5A
AA88 C8 AB 8D CB AB 85 15 20 :81
AA90 F7 BE A9 20 20 D2 FF 20 :03
AA98 D2 FF A9 24 20 D2 FF AD :E0
AAA0 C8 AB 20 C5 AD 8A 20 D2 :3F
AAA8 FF 98 20 D2 FF AD C7 AB :51
AAB0 20 C5 AD 8A 20 D2 FF 98 :CE
AAB8 20 D2 FF 20 CF FF 20 B7 :96
AAC0 FF D0 14 AD CA AB 18 69 :33
AAC8 01 8D CA AB AD CB AB 69 :05
AAD0 00 8D CB AB 4C BB AA A9 :C3
AAD8 73 85 26 A9 AB 85 27 20 :F1
AAE0 48 BD 20 D2 FF AE CA AB :37
AAE8 86 14 AD CB AB 85 15 20 :D1
AAF0 F7 BE A9 20 20 D2 FF 20 :63
AAF8 D2 FF A9 24 20 D2 FF AD :40
AB00 CB AB 20 C5 AD 8A 20 D2 :A2
AB08 FF 98 20 D2 FF AD CA AB :C6
AB10 20 C5 AD 8A 20 D2 FF 98 :2E
```

```
AB18 20 D2 FF A9 0D 20 D2 FF :34
AB20 20 D2 FF 20 D2 FF A9 01 :1C
AB28 20 C3 FF 20 CC FF 4C 32 :E5
AB30 BA 00 45 52 52 4F 52 00 :B3
AB38 93 0D 20 20 41 44 44 20 :7E
AB40 20 20 20 20 4C 49 4E 45 :FC
AB48 20 20 20 20 20 4C 41 42 :C7
AB50 45 4C 0D 00 00 00 00 00 :54
AB58 00 00 00 00 00 00 00 00 :58
AB60 00 00 00 00 00 00 00 00 :60
AB68 00 00 00 00 00 00 00 00 :68
AB70 00 00 00 0D 0D 0D 0D 20 :8E
AB78 45 4E 44 20 41 44 44 52 :EE
AB80 45 53 53 20 00 93 0D 1D :99
AB88 1D 1D 1D 1D 1D 1D 1D 1D :9C
AB90 12 47 45 54 20 53 54 41 :35
AB98 52 54 20 45 4E 44 20 41 :33
ABA0 44 44 52 45 53 53 0D 0D :CA
ABA8 0D 0D 20 46 49 4C 45 4E :CF
ABB0 41 4D 45 20 00 0D 0D 0D :EB
ABB8 20 53 54 41 52 54 20 41 :F8
ABC0 44 44 52 45 53 53 00 00 :27
ABC8 00 00 00 00 41 44 44 20 :81
ABD0 4C 4F 4F 4B 20 46 4F 52 :D0
ABD8 00 00 00 41 44 44 4E 4F :62
ABE0 54 20 46 4E 44 00 00 00 :D2
ABE8 00 00 00 00 00 00 00 00 :E8
ABF0 00 00 00 00 00 00 00 00 :F0
ABF8 00 00 00 00 00 00 00 00 :F8
AC00 25 FF FF FF FF FF FF FF :02
AC08 FF FF FF FF FF FF FF FF :E4
AC10 FF FF FF FF FF FF FF FF :EC
AC18 FF FF FF FF FF FF FF FF :F4
AC20 00 00 00 00 00 00 00 00 :20
AC28 00 00 00 00 00 00 00 00 :28
AC30 00 00 00 00 00 00 00 00 :30
AC38 00 00 00 00 00 00 00 00 :38
AC40 A9 8C 85 26 A9 B8 85 27 :A0
AC48 20 48 BD 20 5B BD 90 03 :EC
AC50 4C CA AE A5 14 8D 79 B4 :6F
AC58 85 FB A5 15 8D 7A B4 85 :C7
AC60 FC A9 C0 85 26 A9 B8 85 :E6
AC68 27 20 48 BD 20 5B BD 90 :08
AC70 03 4C 40 AC A6 14 A4 15 :55
AC78 8E 7B B4 8C 7C B4 78 A5 :5C
AC80 01 29 FD 85 01 A9 00 8D :41
AC88 FA FF 8D FB FF 8D FC FF :38
AC90 8D FD FF 8D FE FF 8D FF :0B
AC98 FF A5 01 09 02 85 01 58 :F7
ACA0 AD 7C B4 CD 7A B4 F0 05 :E7
ACA8 B0 36 4C B7 AC AD 7B B4 :EB
ACB0 CD 79 B4 F0 02 B0 29 A9 :DC
ACB8 F3 85 26 A9 B8 85 27 20 :92
ACC0 48 BD A9 05 85 26 A9 B9 :75
ACC8 85 27 20 48 BD 20 E4 FF :C0
ACD0 F0 FB C9 59 D0 03 4C 40 :AB
ACD8 AC C9 4E D0 F0 4C CA AE :AE
ACE0 A9 E0 8D 00 BC A9 AD 8D :B5
ACE8 01 BC A9 15 85 26 A9 B9 :94
ACF0 85 27 20 48 BD 20 5B BD :19
ACF8 90 06 20 4B AF 4C 0A AD :01
AD00 A5 14 8D 7D B4 A5 15 8D :C5
AD08 7E B4 20 44 E5 A9 B4 85 :E1
AD10 FE A9 6B 85 FD A0 00 B1 :EE
AD18 FD F0 07 99 00 02 C8 4C :52
AD20 17 AD 99 00 02 C8 C8 C8 :CE
AD28 C8 C8 84 0B AD 7A B4 20 :61
AD30 C5 AD 8E 05 02 8C 06 02 :99
AD38 AD 79 B4 20 C5 AD 8E 07 ;74
AD40 02 8C 08 02 20 93 AE 4C :AE
AD48 45 BA AD 8A B4 85 14 AD :C6
AD50 87 B4 85 15 A9 4C 8D 00 :12
AD58 02 20 01 BB AD 88 B4 8D :6E
AD60 01 02 AE 89 B4 20 07 AF :80
AD68 AD 83 B4 8D 02 02 AD 82 :4C
AD70 B4 8D 03 02 AD 81 B4 8D :0A
AD78 04 02 A9 20 8D 05 02 A0 :E8
AD80 04 B1 5F F0 07 99 02 02 :9A
AD88 C8 4C 81 AD 99 02 02 98 :F6
AD90 18 69 07 85 0B A9 00 8D :38
```

```
AD98 8B B4 4C 45 BA A9 00 8D :83
ADA0 08 02 A0 0D 4C C9 B1 18 :89
ADA8 A5 FB 69 01 4C BC AD 18 :E1
ADB0 A5 FB 69 02 4C BC AD 18 :ED
ADB8 A5 FB 69 03 85 FB A5 FC :78
ADC0 69 00 85 FC 60 48 4A 4A :8E
ADC8 4A 4A C9 0A 90 02 69 06 :14
ADD0 69 30 AA 68 29 0F C9 0A :2D
ADD8 90 02 69 06 69 30 A8 60 :84
ADE0 AD 8B B4 F0 03 4C 4A AD :C4
ADE8 A5 FC CD 7C B4 F0 08 B0 :B8
ADF0 03 4C FE AD 4C CA AE A5 :5B
ADF8 FB CD 7B B4 B0 F6 20 E4 :02
AE00 FF C9 03 D0 03 4C CD AE :BC
AE08 A0 00 B1 FB AA BD 8C B4 :DB
AE10 8D 00 02 BD BC B5 8D 01 :74
AE18 02 BD 8C B6 8D 02 02 A9 :33
AE20 20 8D 03 02 BD 8C B7 8D :CD
AE28 7F B4 C9 00 D0 03 4C 3B :78
AE30 B1 C9 01 D0 03 4C 45 B1 :F8
AE38 C9 02 D0 03 4C 52 B1 C9 :08
AE40 04 D0 03 4C F7 B1 C9 05 :BD
AE48 D0 03 4C 20 B2 C9 07 D0 :63
AE50 03 4C AB B0 C9 08 D0 03 :91
AE58 4C DA B1 C9 09 D0 03 4C :11
AE60 9E B1 C9 0D D0 03 4C B5 :CD
AE68 B1 C9 03 D0 03 4C B3 B3 :48
AE70 C9 0A D0 03 4C 7E B3 C9 :66
AE78 0B D0 03 4C 94 B3 C9 0C :51
AE80 D0 03 4C D0 AE C9 06 D0 :40
AE88 03 4C 50 B2 C9 0E D0 C1 :D4
AE90 4C 73 B1 AD 7D B4 85 14 :75
AE98 AD 7E B4 85 15 C9 FF D0 :09
AEA0 07 AD 7D B4 C9 FA B0 12 :71
AEA8 AD 7D B4 18 69 0A 8D 7D :D7
AEB0 B4 AD 7E B4 69 00 8D 7E :E0
AEB8 B4 60 68 68 A9 D6 85 26 :28
AEC0 A9 B8 85 27 20 48 BD 4C :DF
AEC8 32 BA 4C 03 A0 4C 00 A0 :46
AED0 A0 01 B1 FB 8D 78 B4 C8 :2E
AED8 B1 FB 8D 77 B4 A9 28 8D :FC
AEE0 04 02 A9 24 8D 05 02 AD :C8
AEE8 77 B4 20 C5 AD 8E 06 02 :2A
AEF0 8C 07 02 AD 78 B4 20 C5 :DC
AEF8 AD 8E 08 02 8C 09 02 A9 :29
AF00 29 8D 0A 02 4C A7 B3 F8 :74
AF08 A9 00 8D 81 B4 8D 82 B4 :5C
AF10 E0 00 F0 15 CA 18 AD 81 :59
AF18 B4 69 01 8D 81 B4 AD 82 :5D
AF20 B4 69 00 8D 82 B4 4C 10 :30
AF28 AF D8 AD 82 B4 09 30 8D :08
AF30 83 B4 AD 81 B4 29 F0 4A :80
AF38 4A 4A 4A 09 30 8D 82 B4 :84
AF40 AD 81 B4 29 0F 09 30 8D :E8
AF48 81 B4 60 A5 2B 85 61 A5 :A9
AF50 2C 85 62 A9 00 85 39 85 :25
AF58 3A A0 00 B1 61 C8 11 61 :AA
AF60 F0 1B A0 02 B1 61 85 39 :94
AF68 C8 B1 61 85 3A A0 00 B1 :33
AF70 61 48 C8 B1 61 85 62 68 :6E
AF78 85 61 4C 59 AF 18 A5 39 :4D
AF80 69 0A 8D 7D B4 A5 3A 69 :D8
AF88 00 8D 7E B4 60 60 AD 77 :7F
AF90 B4 CD 7A B4 90 F7 F0 03 :5E
AF98 4C A5 AF AD 78 B4 CD 79 :E2
AFA0 B4 F0 02 90 E8 AD 77 B4 :F1
AFA8 CD 7C B4 F0 05 B0 DE 4C :F4
AFB0 BC AF AD 78 B4 CD 7B B4 :00
AFB8 B0 D3 F0 D1 68 68 78 A5 :0A
AFC0 01 29 FD 85 01 A9 FA 85 :17
AFC8 FD A9 FF 85 FE A0 01 B1 :6D
AFD0 FD F0 1C CD 77 B4 F0 06 :80
AFD8 20 EE B2 4C CD AF 88 B1 :75
AFE0 FD CD 78 B4 D0 03 4C 5C :C5
AFE8 B0 20 EE B2 4C CD AF A0 :7D
AFF0 00 AD 78 B4 91 FD C8 AD :25
AFF8 77 B4 91 FD C8 A9 00 91 :E4
B000 FD C8 91 FD C8 20 70 B0 :6C
B008 A9 4C 8D 04 02 AD 75 B4 :EB
B010 91 FD 8D 05 02 AD 76 B4 :48
```

```
B018 C8 91 FD 8D 84 B4 20 1B
B020 B3 AD 84 B4 AA 20 07 AF
B028 AD 83 B4 8D 06 02 AD 82
B030 B4 8D 07 02 AD 81 B4 8D
B038 08 02 A5 01 09 02 85 01
B040 58 AD 7F B4 C9 0A D0 03
B048 4C 87 B3 C9 0B D0 03 4C
B050 9D B3 C9 03 D0 03 4C BC
B058 B3 4C 94 B2 A0 04 B1 FD
B060 F0 17 8D 05 02 A9 4C 8D
B068 04 02 C8 B1 FD 4C 24 B0
B070 EE 76 B4 D0 03 EE 75 B4
B078 60 A9 01 8D 8B B4 A0 02
B080 B1 FD 8D 8A B4 C8 B1 FD
B088 8D 87 B4 C8 20 70 B0 A9
B090 4C 8D 04 02 AD 75 B4 8D
B098 05 02 8D 88 B4 91 FD C8
B0A0 AD 76 B4 91 FD 8D 89 B4
B0A8 4C 24 B0 20 F3 B0 A0 00
B0B0 B1 FB AA BD 2B B9 C9 FF
B0B8 D0 03 4C 2E B1 A2 20 8E
B0C0 07 02 8E 09 02 8E 03 02
B0C8 A2 42 8E 00 02 A2 59 8E
B0D0 01 02 A2 54 8E 02 02 A0
B0D8 21 8C 08 02 8D 0A 02 A9
B0E0 00 8D 0B 02 A9 0B 8D 00
B0E8 BC A9 B1 8D 01 BC A0 10
B0F0 4C E6 B1 A0 00 B1 FB A2
B0F8 24 8E 04 02 20 C5 AD 8E
B100 05 02 8C 06 02 A9 00 8D
B108 07 02 60 A5 FC CD 7C B4
B110 F0 08 B0 03 4C 21 B1 4C
B118 CA AE A5 FB CD 7B B4 B0
B120 F6 20 E4 FF C9 03 D0 03
B128 4C CD AE 4C AB B0 A9 E0
B130 8D 00 BC A9 AD 8D 01 BC
B138 4C E0 AD A9 00 8D 04 02
B140 A0 09 4C E6 B1 20 58 B4
B148 A9 00 8D 07 02 A0 0C 4C
B150 C9 B1 A9 23 8D 04 02 A9
B158 24 8D 05 02 A0 01 B1 FB
B160 20 C5 AD 8E 06 02 8C 07
B168 02 A9 00 8D 08 02 A0 0D
B170 4C C9 B1 A0 01 B1 FB C9
B178 A9 D0 03 4C 89 B1 C9 A2
B180 D0 03 4C 89 B1 C9 A0 D0
B188 12 A9 42 8D 00 02 A9 59
B190 8D 01 02 A9 54 8D 02 02
B198 4C AB B0 4C B3 B3 20 58
B1A0 B4 A9 2C 8D 07 02 A9 58
B1A8 8D 08 02 A9 00 8D 09 02
B1B0 A0 0E 4C C9 B1 20 58 B4
B1B8 A9 2C 8D 07 02 A9 59 8D
B1C0 08 02 A9 00 8D 09 02 A0
B1C8 0E 84 0B 20 C2 B2 20 93
B1D0 AE 20 D4 B3 20 AF AD 4C
B1D8 45 BA A9 41 8D 04 02 A9
B1E0 00 8D 05 02 A0 0A 84 0B
B1E8 20 C2 B2 20 93 AE 20 D4
B1F0 B3 20 A7 AD 4C 45 BA A9
B1F8 28 8D 04 02 A9 24 8D 05
B200 02 A0 01 B1 FB 20 C5 AD
B208 8E 06 02 8C 07 02 A9 2C
B210 8D 08 02 A9 58 8D 09 02
B218 A9 29 8D 0A 02 4C 46 B2
B220 A9 28 8D 04 02 A9 24 8D
B228 05 02 A0 01 B1 FB 20 C5
B230 AD 8E 06 02 8C 07 02 A9
B238 29 8D 08 02 A9 2C 8D 09
B240 02 A9 59 8D 0A 02 A9 00
B248 8D 0B 02 A0 10 4C C9 B1
B250 A5 FB 18 69 02 8D 85 B4
B258 A5 FC 69 00 8D 86 B4 A0
B260 01 B1 FB 30 39 18 6D 85
B268 B4 8D 78 B4 AD 86 B4 69
B270 00 8D 77 B4 20 8E AF A9
B278 24 8D 04 02 AD 77 B4 20
B280 C5 AD 8E 05 02 8C 06 02
B288 AD 78 B4 20 C5 AD 8E 07
B290 02 8C 08 02 A9 00 8D 09
```

```
B298 02
B2A0 B4
B2A8 B4
B2B0 B4
B2B8 00
B2C0 77
B2C8 01
B2D0 FE
B2D8 FC
B2E0 B2
B2E8 20
B2F0 FD
B2F8 00
B300 91
B308 AD
B310 B4
B318 C8
B320 98
B328 40
B330 91
B338 A0
B340 8B
B348 FD
B350 20
B358 AD
B360 B4
B368 04
B370 A9
B378 05
B380 B4
B388 20
B390 20
B398 8D
B3A0 05
B3A8 00
B3B0 40
B3B8 AD
B3C0 A9
B3C8 20
B3D0 A2
B3D8 F7
B3E0 00
B3E8 00
B3F0 C
B3F8 F
B400 0
B408 F
B410 2
B418 A
B420 A
B428 F
B430 B
B438 F
B440 7
B448 8
B450 A
B458 A
B460 F
B468 0
B470 2
B478 0
B480 0
B488 0
B490 4
B498 4
B4A0 4
B4A8 4
B4B0 4
B4B8 4
B4C0 4
B4C8 4
B4D0 4
B4D8 4
B4E0 4
B4E8 4
B4F0 4
B4F8 4
B500 4
B508 4
B510 5
```

```
B298 02 A0 0E 4C C9 B1 8D 84 :42
B2A0 B4 38 A9 00 ED 84 B4 8D :CC
B2A8 84 B4 38 AD 85 B4 ED 84 :5C
B2B0 B4 8D 78 B4 AD 86 B4 E9 :6F
B2B8 00 8D 77 B4 20 8E AF 4C :24
B2C0 77 B2 78 A5 01 29 FD 85 :A5
B2C8 01 A9 FA 85 FD A9 FF 85 :25
B2D0 FE A0 01 B1 FD F0 25 C5 :91
B2D8 FC F0 06 20 EE B2 4C D1 :B4
B2E0 B2 88 B1 FD C5 FB F0 43 :0C
B2E8 20 EE B2 4C D1 B2 38 A5 :18
B2F0 FD E9 06 85 FD A5 FE E9 :EE
B2F8 00 85 FE 60 A0 00 A5 FB :F7
B300 91 FD C8 A5 FC 91 FD C8 :F4
B308 AD 7D B4 91 FD C8 AD 7E :5B
B310 B4 91 FD C8 A9 00 91 FD :29
B318 C8 91 FD 20 EE B2 A0 00 :AB
B320 98 91 FD C8 C0 06 D0 F9 :4D
B328 4C 76 B3 A0 02 AD 7D B4 :1C
B330 91 FD C8 AD 7E B4 91 FD :54
B338 A0 12 B9 FF 01 99 05 02 :F1
B340 88 C0 00 D0 F5 A0 04 B1 :B5
B348 FD 8D 01 02 C8 B1 FD AA :B3
B350 20 07 AF A9 4C 8D 00 02 :09
B358 AD 83 B4 8D 02 02 AD 82 :3C
B360 B4 8D 03 02 AD B1 B4 8D :FA
B368 04 02 A9 20 8D 05 02 18 :98
B370 A5 0B 69 06 85 0B A5 01 :E4
B378 09 02 85 01 58 60 20 2A :40
B380 B4 20 8E AF 20 3A B4 A9 :0A
B388 2C 8D 09 02 A9 58 8D 0A :79
B390 02 4C A7 B3 20 2A B4 20 :73
B398 8E AF 20 3A B4 A9 2C 8D :E2
B3A0 09 02 A9 59 8D 0A 02 A9 :5F
B3A8 00 8D 0B 02 A9 10 85 0B :93
B3B0 4C C5 B3 20 2A B4 20 8E :79
B3B8 AF 20 3A B4 A9 00 8D 09 :95
B3C0 02 A9 0E 85 0B 20 C2 B2 :27
B3C8 20 93 AE 20 D4 B3 20 B7 :86
B3D0 AD 4C 45 BA 20 FA B3 20 :2D
B3D8 F7 BE A9 20 20 D2 FF A0 :4B
B3E0 00 B4 FD A0 02 84 FE A0 :73
B3E8 00 B1 FD F0 07 20 D2 FF :9A
B3F0 C8 4C E9 B3 A9 0D 20 D2 :E2
B3F8 FF 60 A9 20 20 D2 FF A9 :FF
B400 03 8D 86 02 A9 24 20 D2 :4C
B408 FF A5 FC 20 1E B4 A5 FB :EE
B410 20 1E B4 A9 20 20 D2 FF :42
B418 A9 0E 8D 86 02 60 20 C5 :EE
B420 AD 8A 20 D2 FF 98 20 D2 :84
B428 FF 60 A0 01 B1 FB 8D 78 :8D
B430 B4 C8 B1 FB 8D 77 B4 E1 :72
B438 FB 60 A9 24 8D 04 02 AD :CD
B440 77 B4 20 C5 AD 8E 05 02 :7B
B448 8C 06 02 AD 78 B4 20 C5 :32
B450 AD 8E 07 02 8C 08 02 60 :30
B458 A9 24 8D 04 02 A0 01 B1 :59
B460 FB 20 C5 AD 8E 05 02 8C :F0
B468 06 02 60 AC 20 B2 20 24 :0E
B470 20 20 20 20 00 41 00 00 :36
B478 00 00 00 00 00 00 00 00 :78
B480 00 00 00 00 00 00 00 00 :80
B488 00 00 00 00 42 4F 42 42 :8A
B490 42 4F 41 42 50 4F 41 42 :7C
B498 42 4F 41 42 42 4F 42 42 :45
B4A0 42 4F 41 42 43 4F 42 42 :52
B4A8 42 4F 41 42 4A 41 42 42 :29
B4B0 42 41 52 42 50 41 52 42 :D6
B4B8 42 41 52 42 42 41 42 42 :28
B4C0 42 41 52 42 53 41 42 42 :85
B4C8 42 41 52 42 52 45 42 42 :A0
B4D0 42 45 4C 42 50 45 4C 42 :DA
B4D8 4A 45 4C 42 42 45 42 42 :5E
B4E0 42 45 4C 42 43 45 42 42 :63
B4E8 42 45 4C 42 52 41 42 42 :9E
B4F0 42 41 52 42 50 41 52 42 :16
B4F8 4A 41 52 42 42 41 42 42 :70
B500 42 41 52 42 53 41 42 42 :C5
B508 42 41 52 42 42 53 42 42 :E4
B510 53 53 53 42 44 42 54 42 :46
B518 53 53 53 42 42 53 42 42 :2C
B520 53 53 53 42 54 53 54 42 :0C
B528 42 53 42 42 4C 4C 4C 42 :46
B530 4C 4C 4C 42 54 4C 54 42 :C8
B538 4C 4C 4C 42 42 4C 42 42 :F8
B540 4C 4C 4C 42 43 4C 54 42 :83
B548 4C 4C 4C 42 43 43 42 42 :D7
B550 43 43 44 42 49 43 44 42 :D8
B558 43 43 44 42 42 43 42 42 :AF
B560 42 43 44 42 43 43 42 42 :BB
B568 42 43 44 42 43 53 42 42 :23
B570 43 53 49 42 49 53 4E 42 :CD
B578 43 53 49 42 42 53 42 42 :5E
B580 42 53 49 42 53 53 42 42 :BA
B588 42 53 49 42 52 52 59 59 :10
B590 59 52 53 59 48 52 53 59 :4B
B598 59 52 53 59 50 52 59 59 :A5
B5A0 59 52 53 59 4C 52 59 59 :99
B5A8 59 52 53 59 53 4E 59 59 :AC
B5B0 49 4E 4F 59 4C 4E 4F 59 :27
B5B8 49 4E 4F 59 4D 4E 59 59 :7A
B5C0 59 4E 4F 59 45 4E 59 59 :6A
B5C8 59 4E 4F 59 54 4F 59 59 :C3
B5D0 59 4F 53 59 48 4F 53 59 :73
B5D8 4D 4F 53 59 56 4F 59 59 :DF
B5E0 59 4F 53 59 4C 4F 59 59 :C1
B5E8 59 4F 53 59 54 44 59 59 :AF
B5F0 59 44 4F 59 4C 44 4F 59 :27
B5F8 4D 44 4F 59 56 44 59 59 :9B
B600 59 44 4F 59 45 44 59 59 :5A
B608 59 44 4F 59 59 54 59 59 :26
B610 54 54 54 59 45 59 58 59 :0B
B618 54 54 54 59 43 54 59 59 :F2
B620 54 54 54 59 59 54 58 59 :61
B628 59 54 59 59 44 44 44 59 :28
B630 44 44 44 59 41 44 41 59 :98
B638 44 44 44 59 43 44 59 59 :52
B640 44 44 44 59 4C 44 53 59 :5D
B648 44 44 44 59 50 4D 59 59 :D9
B650 50 4D 45 59 4E 4D 45 59 :6C
B658 50 4D 45 59 4E 4D 59 59 :00
B660 59 4D 45 59 4C 4D 59 59 :07
B668 59 4D 45 59 50 42 59 59 :E1
B670 50 42 4E 59 4E 42 4F 59 :95
B678 50 42 4E 59 45 42 59 59 :B6
B680 59 42 4E 59 45 42 59 59 :C7
B688 59 42 4E 59 4B 41 54 54 :9C
B690 54 41 4C 54 50 41 4C 54 :64
B698 54 41 4C 54 4C 41 54 54 :90
B6A0 54 41 4C 54 43 41 54 54 :6B
B6A8 54 41 4C 54 52 44 54 54 :D0
B6B0 54 44 4C 54 50 44 4C 54 :9C
B6B8 54 44 4C 54 49 44 54 54 :B9
B6C0 54 44 4C 54 43 44 54 54 :A3
B6C8 54 44 4C 54 49 52 54 54 :1D
B6D0 54 52 52 54 41 52 52 54 :1D
B6D8 50 52 52 54 43 52 54 54 :39
B6E0 54 52 52 54 49 52 54 54 :63
B6E8 54 52 52 54 53 43 54 54 :43
B6F0 54 43 52 54 41 43 52 54 :C5
B6F8 50 43 52 54 53 43 54 54 :31
B700 54 43 52 54 49 43 54 54 :0B
B708 54 43 52 54 54 41 54 54 :3E
B710 59 41 58 54 59 54 41 54 :5F
B718 59 41 58 54 43 41 54 54 :0C
B720 59 41 58 54 41 41 53 54 :03
B728 54 41 54 54 59 41 58 54 :95
B730 59 41 58 54 59 41 58 54 :AE
B738 59 41 58 54 53 41 54 54 :7C
B740 59 41 58 54 56 41 58 54 :AF
B748 59 41 58 54 59 50 54 54 :04
B750 59 50 43 54 59 50 58 54 :07
B758 59 50 43 54 45 50 54 54 :8F
B760 54 50 43 54 44 50 54 54 :8D
B768 54 50 43 54 58 43 54 54 :AB
B770 58 43 43 54 58 43 50 54 :81
B778 58 43 43 54 51 43 54 54 :82
B780 54 43 43 54 44 43 54 54 :45
B788 54 43 43 54 00 04 07 07 :FC
B790 07 01 01 07 00 02 08 07 :34
B798 07 03 03 07 06 05 07 07 :6F
B7A0 07 09 09 07 00 0B 07 07 :9B
B7A8 07 0A 0A 07 03 04 07 07 :8D
B7B0 01 01 01 07 00 02 08 07 :4E
B7B8 0E 03 03 07 06 05 07 07 :96
B7C0 07 09 09 07 00 0B 07 07 :BB
B7C8 07 0A 0A 07 00 04 07 07 :9E
B7D0 07 01 01 07 00 02 08 07 :74
B7D8 03 03 03 07 06 05 07 07 :AB
B7E0 07 09 09 07 00 0B 07 07 :DB
B7E8 07 0A 0A 07 00 04 07 07 :BE
B7F0 07 01 01 07 00 02 08 07 :94
B7F8 0C 03 03 07 06 05 07 07 :D4
B800 07 09 09 07 00 0B 07 07 :FB
B808 07 0A 0A 07 07 04 07 07 :01
B810 01 01 01 07 00 07 00 07 :94
B818 03 03 03 07 06 05 07 07 :EB
B820 09 09 0D 07 00 0B 00 07 :F8
B828 07 0A 07 07 02 04 02 07 :DC
B830 01 01 01 07 00 02 00 07 :96
B838 03 03 03 07 06 05 07 07 :0B
B840 09 09 0D 07 00 0B 00 07 :18
B848 0A 0A 0B 07 02 04 07 07 :2E
B850 01 01 01 07 00 02 00 07 :B6
B858 03 03 03 07 06 05 07 07 :2B
B860 07 09 09 07 00 0B 07 07 :5B
B868 07 0A 0A 07 02 04 07 07 :48
B870 01 01 01 07 00 02 00 07 :D6
B878 03 03 03 07 06 05 07 07 :4B
B880 07 09 09 07 00 0B 07 07 :7B
B888 07 0A 0A 07 93 11 1D 1D :D5
B890 1D 1D 1D 1D 1D 1D 1D 1D :A4
B898 1D 1D 12 44 49 53 41 53 :F3
B8A0 53 45 4D 42 4C 45 20 52 :F6
B8A8 54 4E 0D 11 11 20 44 49 :3C
B8B0 53 41 53 53 45 4D 42 4C :1F
B8B8 45 20 46 52 4F 4D 20 00 :90
B8C0 0D 0D 0D 1D 1D 1D 1D 1D :74
B8C8 1D 1D 1D 1D 1D 1D 1D 1D :DC
B8D0 1D 1D 54 4F 20 00 93 1D :EC
B8D8 1D 11 11 20 4C 49 4E 45 :46
B8E0 20 4E 55 4D 42 45 52 20 :F5
B8E8 54 4F 20 48 49 47 48 20 :69
B8F0 0D 0D 00 0D 0D 20 45 4E :9F
B8F8 44 20 41 44 44 20 54 4F :27
B900 20 4C 4F 57 00 0D 0D 20 :AA
B908 43 4F 4E 54 49 4E 55 45 :DF
B910 20 59 2F 4E 00 0D 0D 0D :B8
B918 20 53 54 41 52 54 20 4C :B0
B920 49 4E 45 20 4E 55 4D 42 :03
B928 45 52 00 2A 2A 3F 3F 3F :B6
B930 2A 3F 3F 2A 2A 3F 3F 2A :92
B938 2A 2A 3F 3F 2A 2A 2A 2A :B3
B940 3F 3F 3F 3F 3F 3F 3F 2A :74
B948 2A 2A 2A 20 21 22 23 24 :4A
B950 25 26 27 28 29 2A 2B 2C :2C
B958 2D 2E 2F 30 31 32 33 34 :54
B960 35 36 37 38 39 3A 3B 3C :7C
B968 3D 3E 3F 40 41 42 43 44 :A4
B970 45 46 47 48 49 4A 4B 4C :CC
B978 4D 4E 4F 50 51 52 53 54 :F4
B980 55 56 57 58 59 5A 5B 5C :1C
B988 5D 5E 5F 3F 3F 3F 3F 3F :20
B990 3F 3F 3F 3F 3F 3F 3F 3F :6C
B998 3F 3F 3F 3F 3F 3F 3F 3F :74
B9A0 3F 3F 3F 3F 3F 3F 3F 3F :7C
B9A8 3F 3F 3F 3F 2A 3F 3F FF :1B
B9B0 FF FF 3F FF 3F FF 3F FF :4C
B9B8 2A 2A 3F 2A 2A 2A 2A 2A :DF
B9C0 2A 2A 2A 2A 2A 2A 2A 2A :A8
B9C8 2A 2A 2A 2A FF FF 3F FF :12
B9D0 FF FF 3F FF FF FF 3F FF :2C
B9D8 FF FF 3F FF FF 3F 3F FF :B4
B9E0 FF FF 3F FF FF FF 3F FF :3C
B9E8 FF FF 3F FF FF 3F 3F FF :C4
B9F0 FF FF 3F FF FF FF 3F FF :4C
B9F8 FF FF 3F FF FF 3F 3F 3F :D4
BA00 FF FF 3F FF FF 3F 3F 3F :DC
BA08 FF FF 3F FF FF 3F 3F FF :E4
BA10 FF FF 3F FF FF FF 3F FF :6C
```

```
BA18 FF FF 3F FF FF 3F 3F 3F :F4
BA20 FF FF 3F FF FF 3F 3F 3F :FC
BA28 FF FF 3F FF FF 3F 3F FF :04
BA30 FF 3F A9 19 85 26 A9 BD :10
BA38 85 27 20 48 BD 20 E4 FF :30
BA40 F0 FB 4C 00 A0 20 01 BB :C9
BA48 90 44 A0 01 B1 5F 85 23 :AE
BA50 A5 2D 85 22 A5 60 85 25 :AA
BA58 A5 5F 88 F1 5F 18 65 2D :AD
BA60 85 2D 85 24 A5 2E 69 FF :82
BA68 85 2E E5 60 AA 38 A5 5F :95
BA70 E5 2D A8 B0 03 E8 C6 25 :78
BA78 18 65 22 90 03 C6 23 18 :68
BA80 B1 22 91 24 C8 D0 F9 E6 :7F
BA88 23 E6 25 CA D0 F2 20 30 :2A
BA90 BB 20 D4 BA AD 00 02 F0 :DE
BA98 38 18 A5 2D 85 5A 65 0B :73
BAA0 85 58 A4 2E 84 5B 90 01 :27
BAA8 C8 84 59 20 73 BB A5 14 :C7
BAB0 A4 15 8D FE 01 8C FF 01 :6B
BAB8 A5 31 A4 32 85 2D 84 2E :26
BAC0 A4 0B 88 B9 FC 01 91 5F :D7
BAC8 88 10 F8 20 30 BB 20 D4 :AA
BAD0 BA 4C FF BB A5 2B A4 2C :22
BAD8 85 22 84 23 18 A0 01 B1 :80
BAE0 22 F0 1D A0 04 C8 B1 22 :64
BAE8 D0 FB C8 98 65 22 AA A0 :D1
BAF0 00 91 22 A5 23 69 00 C8 :71
BAF8 91 22 86 22 85 23 90 DD :2A
BB00 60 A5 2B A6 2C A0 01 85 :8E
BB08 5F 86 60 B1 5F F0 1F C8 :EB
BB10 C8 A5 15 D1 5F 90 18 F0 :08
BB18 03 88 D0 09 A5 14 88 D1 :B0
BB20 5F 90 0C F0 0A 88 B1 5F :B4
BB28 AA 88 B1 5F B0 D7 18 60 :93
BB30 20 65 BB A9 00 D0 2D 20 :0A
BB38 E7 FF A5 37 A4 38 85 33 :A7
BB40 84 34 A5 2D A4 2E 85 2F :32
BB48 84 30 85 31 84 32 20 E2 :2F
BB50 BB A2 19 86 16 68 A8 68 :68
BB58 A2 FA 9A 48 98 48 A9 00 :23
BB60 85 3E 85 10 60 18 A5 2B :7B
BB68 69 FF 85 7A A5 2C 69 FF :5E
BB70 85 7B 60 20 B5 BB 85 31 :A1
BB78 84 32 38 A5 5A E5 5F 85 :7D
BB80 22 A8 A5 5B E5 60 AA E8 :EC
BB88 98 F0 23 A5 5A 38 E5 22 :62
BB90 85 5A B0 03 C6 5B 38 A5 :95
BB98 58 E5 22 85 58 B0 08 C6 :74
BBA0 59 90 04 B1 5A 91 58 88 :B9
BBA8 D0 F9 B1 5A 91 58 C6 5B :0C
BBB0 C6 59 CA D0 F2 C4 34 90 :04
BBB8 28 D0 04 C5 33 90 22 48 :2D
BBC0 A2 09 98 48 B5 57 CA 10 :F5
BBC8 FA 20 02 BC A2 F7 68 95 :6C
BBD0 61 E8 30 FA 68 A8 68 C4 :69
BBD8 34 90 06 D0 14 C5 33 B0 :65
BBE0 10 60 38 A5 2B E9 01 A4 :60
BBE8 2C B0 01 88 85 41 84 42 :62
BBF0 60 A9 37 85 26 A9 BD 85 :62
BBF8 27 20 48 BD 4C 32 BA 4C :49
BC00 FE AD A6 37 A5 38 86 33 :F1
BC08 85 34 A0 00 84 4F 84 4E :4F
BC10 A5 31 A6 32 85 5F 86 60 :4E
BC18 A9 19 A2 00 85 22 86 23 :00
BC20 C5 16 F0 05 20 A3 BC F0 :0B
BC28 F7 A9 07 85 53 A5 2D A6 :82
BC30 2E 85 22 86 23 E4 30 D0 :BD
BC38 04 C5 2F F0 05 20 99 BC :FB
BC40 F0 F3 85 58 86 59 A9 03 :70
BC48 85 53 A5 58 A6 59 E4 32 :E2
BC50 D0 07 C5 31 D0 03 4C E2 :87
BC58 BC 85 22 86 23 A0 00 B1 :93
BC60 22 AA C8 B1 22 08 C8 B1 :CC
BC68 22 65 58 85 58 C8 B1 22 :BF
BC70 65 59 85 59 28 10 D3 BA :B7
BC78 30 D0 C8 B1 22 A0 00 0A :1E
BC80 69 05 65 22 85 22 90 02 :0F
BC88 E6 23 A6 23 E4 59 D0 04 :8C
BC90 C5 58 F0 BA 20 A3 BC F0 :D3
```

```
BC98 F3 B1 22 30 35 C8 B1 22 :B3
BCA0 10 30 C8 B1 22 F0 2B C8 :E3
BCA8 B1 22 AA C8 B1 22 C5 34 :FF
BCB0 90 06 D0 1E E4 33 B0 1A :7A
BCB8 C5 60 90 16 D0 04 E4 5F :A1
BCC0 90 10 86 5F 85 60 A5 22 :EA
BCC8 A6 23 85 4E 86 4F A5 53 :0E
BCD0 85 55 A5 53 18 65 22 85 :26
BCD8 22 90 02 E6 23 A6 23 A0 :40
BCE0 00 60 A5 4F 05 4E F0 F5 :F0
BCE8 A5 55 29 04 4A A8 85 55 :6F
BCF0 B1 4E 65 5F 85 5A A5 60 :20
BCF8 69 00 85 5B A5 33 A6 34 :F1
BD00 85 58 86 59 20 7A BB A4 :E4
BD08 55 C8 A5 58 91 4E AA E6 :BB
BD10 59 A5 59 C8 91 4E 4C 06 :CB
BD18 BC 0D 20 20 20 50 52 45 :B4
BD20 53 53 20 41 4E 59 20 4B :51
BD28 45 59 20 54 4F 20 43 4F :67
BD30 4E 54 49 4E 55 45 00 0D :E8
BD38 0D 20 4F 55 54 20 4F 46 :83
BD40 20 4D 45 4D 4F 52 59 00 :E3
BD48 A0 00 B1 26 F0 07 20 D2 :DD
BD50 FF C8 4C 4A BD A9 20 20 :72
BD58 D2 FF 60 A2 00 A9 2E 20 :08
BD60 D2 FF E8 E0 05 D0 F8 A2 :39
BD68 00 A9 9D 20 D2 FF E8 E0 :7D
BD70 05 D0 F8 A9 00 A2 00 9D :55
BD78 EC BE E8 E0 07 D0 F8 20 :E3
BD80 E4 FF F0 FB C9 0D F0 73 :81
BD88 C9 14 F0 3E C9 24 D0 0F :2E
BD90 AE F2 BE E0 00 D0 E8 A2 :24
BD98 01 8E F1 BE 4C B7 BD C9 :B9
BDA0 30 90 DC C9 3A B0 03 4C :5F
BDA8 B7 BD AE F1 BE F0 D0 C9 :F5
BDB0 41 90 CC C9 47 B0 C8 AE :04
BDB8 F2 BE E0 05 F0 C1 9D EC :BB
BDC0 BE 20 D2 FF EE F2 BE 4C :14
BDC8 7F BD AE F2 BE E0 00 D0 :09
BDD0 08 A2 00 8E F1 BE 4C 7F :89
BDD8 BD CE F2 BE A9 00 AE F2 :9E
BDE0 BE 9D EC BE A9 9D 20 D2 :FF
BDE8 FF A9 2E 20 D2 FF A9 9D :DE
BDF0 20 D2 FF AE F2 BE D0 87 :7F
BDF8 4C D1 BD AD EC BE F0 07 :A9
BE00 C9 24 D0 05 4C 66 BE 38 :67
BE08 60 A2 00 86 14 86 15 A2 :EF
BE10 00 BD EC BE 20 20 BE E8 :18
BE18 EC F2 BE D0 F4 4C 64 BE :9A
BE20 18 E9 2F 85 07 A5 15 85 :67
BE28 22 C9 19 B0 21 A5 14 0A :46
BE30 26 22 0A 26 22 65 14 85 :0C
BE38 14 A5 22 65 15 85 15 06 :DA
BE40 14 26 15 A5 14 65 07 85 :8E
BE48 14 90 02 E6 15 60 68 68 :DB
BE50 A9 14 20 D2 FF 20 D2 FF :3A
BE58 20 D2 FF 20 D2 FF 20 D2 :1D
BE60 FF 4C 58 BD 18 60 A9 00 :53
BE68 85 14 85 15 AD F0 BE F0 :AB
BE70 03 4C 89 BE A2 03 BD EC :65
BE78 BE 9D ED BE CA E0 00 D0 :E1
BE80 F5 A9 30 8D ED BE 4C 6C :14
BE88 BE AD ED BE 8D F3 BE AD :6C
BE90 EE BE 8D F4 BE 20 AE BE :99
BE98 85 15 AD EF BE 8D F3 BE :A3
BEA0 AD F0 BE 8D F4 BE 20 AE :23
BEA8 BE 85 14 4C 64 BE EA AD :12
BEB0 F3 BE C9 3A 90 0F 29 0F :23
BEB8 18 69 09 0A 0A 0A 0A 8D :01
BEC0 F5 BE 4C CE BE 29 0F 0A :B2
BEC8 0A 0A 0A 8D F5 BE AD F4 :D0
BED0 BE C9 3A 90 0B 29 0F 18 :64
BED8 69 09 8D F6 BE 4C E5 BE :83
BEE0 29 0F 8D F6 BE AD F6 BE :14
BEE8 0D F5 BE 60 00 00 00 00 :99
BEF0 00 00 00 00 00 F0 0F A5 :21
BEF8 15 8D F3 BE A5 14 8D F4 :24
BF00 BE A2 00 A9 30 9D FA BF :12
BF08 E8 E0 05 D0 F8 AD F3 BE :7A
BF10 C9 27 F0 05 B0 0F 4C 3C :C9
```

```
BF18 BF AD F4 BE C9 10 F0 05
BF20 B0 03 4C 3C BF 38 AD F4
BF28 BE E9 10 8D F4 BE AD F3
BF30 BE E9 27 8D F3 BE EE FA
BF38 BF 4C 0D BF AD F3 BE C9
BF40 03 F0 05 B0 0F 4C 6B BF
BF48 AD F4 BE C9 E8 F0 05 B0
BF50 03 4C 6B BF 38 AD F4 BE
BF58 E9 E8 8D F4 BE AD F3 BE
BF60 E9 03 8D F3 BE EE FB BF
BF68 4C 3C BF AD F3 BE C9 00
BF70 F0 05 B0 0F 4C 9A BF AD
BF78 F4 BE C9 64 F0 05 B0 03
BF80 4C 9A BF 38 AD F4 BE E9
BF88 64 8D F4 BE AD F3 BE E9
BF90 00 8D F3 BE EE FC BF 4C
BF98 6B BF AD F3 BE C9 00 F0
BFA0 05 B0 0F 4C C9 BF AD F4
BFA8 BE C9 0A F0 05 B0 03 4C
BFB0 C9 BF 38 AD F4 BE E9 0A
BFB8 8D F4 BE AD F3 BE E9 00
BFC0 8D F3 BE EE FD BF 4C 9A
BFC8 BF AD F4 BE 0D FE BF 8D
BFD0 FE BF A2 00 BD FA BF C9
BFD8 30 D0 10 A9 20 20 D2 FF
BFE0 E8 E0 04 D0 EF 4C F3 BF
BFE8 BD FA BF 20 D2 FF E8 E0
BFF0 04 D0 F5 BD FA BF 20 D2
BFF8 FF 60 30 30 33 39 30 00
C000 A9 C9 85 FB A9 C0 85 FC
C008 A0 00 B1 FB F0 07 20 D2
C010 FF C8 4C 0A C0 20 E4 FF
C018 F0 FB C9 31 F0 0B C9 32
C020 F0 2C C9 33 D0 EF 4C 73
C028 C0 A2 00 BD B1 C0 9D C0
C030 02 E8 E0 18 D0 F5 A9 02
C038 8D 07 A0 A9 CC 8D 08 A0
C040 A2 00 BD 35 C1 F0 51 20
C048 D2 FF E8 4C 42 C0 A2 00
C050 BD B1 C0 9D 3C 03 E8 E0
C058 18 D0 F5 A9 03 8D 07 A0
C060 A9 48 8D 08 A0 A2 00 BD
C068 53 C1 F0 2C 20 D2 FF E8
C070 4C 67 C0 A2 00 BD B1 C0
C078 9D 00 C0 E8 E0 18 D0 F5
C080 A9 C0 8D 07 A0 A9 0C 8D
C088 08 A0 A2 00 BD 71 C1 F0
C090 07 20 D2 FF E8 4C 8C C0
C098 A9 4E 8D 77 02 A9 45 8D
C0A0 78 02 A9 57 8D 79 02 A9
C0A8 0D 8D 7A 02 A9 04 85 C6
C0B0 60 78 A5 01 29 FE 85 01
C0B8 58 4C 00 A0 00 78 A5 01
C0C0 09 01 85 01 58 4C 74 A4
C0C8 00 93 0D 0D 20 20 20 20
C0D0 53 45 4C 45 43 54 20 53
C0D8 59 53 54 45 4D 20 53 54
C0E0 41 52 54 20 4E 55 4D 42
C0E8 45 52 20 0D 0D 0D 0D 20
C0F0 20 20 20 31 29 20 20 37
C0F8 30 34 20 20 20 28 24 30
C100 32 43 30 29 0D 0D 20 20
C108 20 20 32 29 20 20 38 32
C110 38 20 20 20 28 24 30 33
C118 33 43 29 0D 0D 20 20 20
C120 20 33 29 20 20 34 39 31
C128 35 32 20 28 24 43 30 30
C130 30 29 0D 0D 00 93 0D 0D
C138 0D 20 20 41 43 54 49 56
C140 41 54 45 20 57 49 54 48
C148 20 53 59 53 37 30 34 0D
C150 0D 0D 00 93 0D 0D 0D 20
C158 20 41 43 54 49 56 41 54
C160 45 20 57 49 54 48 20 53
C168 59 53 38 32 38 0D 0D 0D
C170 00 93 0D 0D 0D 20 20 41
C178 43 54 49 56 41 54 45 20
C180 57 49 54 48 20 53 59 53
C188 34 39 31 35 32 0D 0D 0D
C190 00 FF EF FF FF FF 55 FF
C198 55 FF 11 FF 55 FF 55 00
```



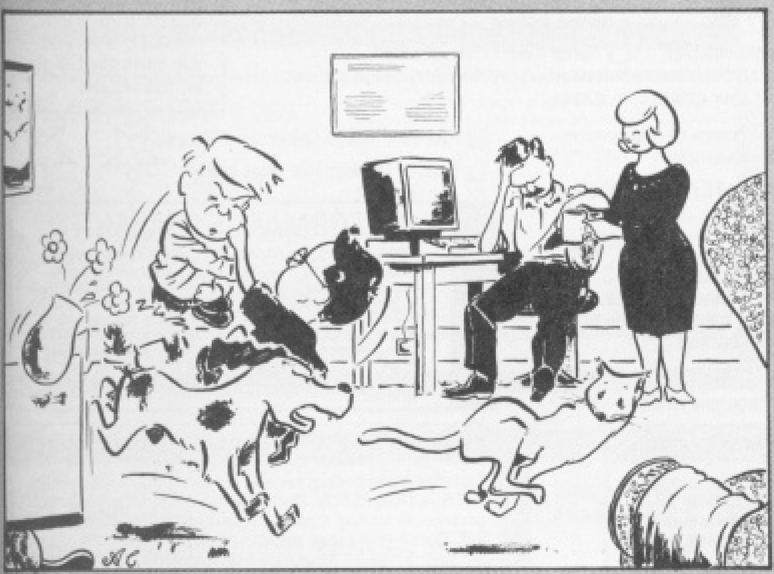
For
profess
process
packag
their
Databa
appear
wordp
sheet
afforda
No
been u
with t
copies
reader
chance
to ente

How

Study
severa
Mark
the r
coupo
coupo

Mini Office II

Your chance to win a copy of the update of the award winning Mini Office for your C64.





*F*or many owners the price of professional software such as word-processors and databases places these packages totally outside the range of their pockets. *Mini Office* from Database created quite a stir when it appeared on the market offering a wordprocessor, database and spread-sheet in one package and at an affordable price.

Now this popular program has been updated and we have arranged with the publishers to give away 10 copies of this new product to 10 lucky readers. All you have to do to have a chance of becoming one of these 10 is to enter our simple competition.

How to Enter

Study the two cartoons, there are several differences between them. Mark the differences on the picture on the right and complete the entry coupon. Send the picture and the coupon to the address below. Make sure that you write the number of differences on the back of your envelope. Entries without the number on the back will be disqualified.

The Rules

Entries will not be accepted from employees of Argus Specialist Publications and Database Software. This restriction also applies to the employees' families and agents of the companies.

The How to Enter section forms part of the rules. The Editor's decision is final and no correspondence will be entered into.

Mini Office II
Entry Coupon

Name ....
Address ....
....
Postcode ....
Number of differences found ....

If I win a copy of *Mini Office II* I would like a Tape/Disk version. (Delete as applicable).
Post to: *Your Commodore*, Mini Office Competition, 1 Golden Square, London, W1R 3AB. Closing date: Friday 26th June 1987.

NEW Mk III

NOW THE FIRST OF A NEW GENERATION OF BACKUP CARTRIDGE

Innovative new hardware design and programming techniques have allowed us to produce a cartridge of a calibre never seen before!!!



Action Replay Mk III is more powerful, more friendly, has more features and will back-up more programs than any competing utility —even the latest protected progams!!

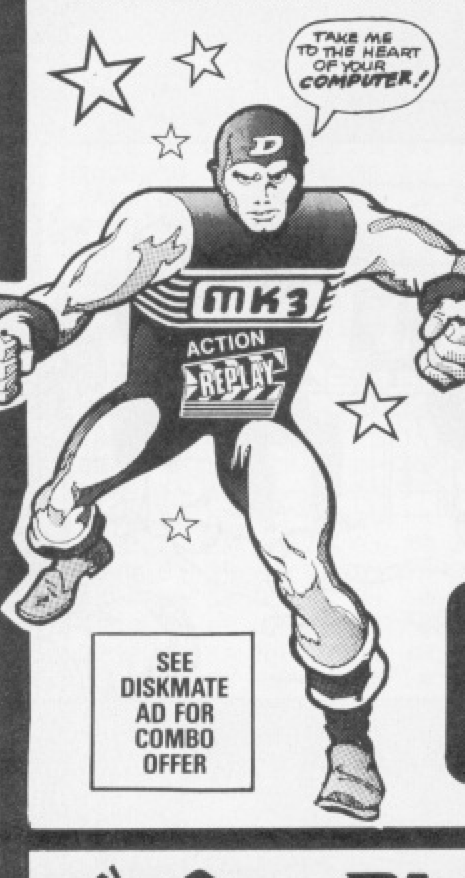
ACTION REPLAY III

Works by taking a "Snapshot" of the program in memory – so it doesn't matter how the program was loaded –from tape or disk – at normal or turbo speed. EVEN SO CALLED "ANTI-FREEZE" PROGRAMS.

ONLY £29.99 POST FREE

JUST LOOK AT THE FEATURES

So simple to use: Just press the button and make a complete backup: Tape to Tape, Tape to Disk, Disk to Disk, Disk to Tape.
– THE PROCESS IS AUTOMATIC – JUST GIVE THE BACKUP A NAME –



- ❑ All backups will reload at turbo speed independently of the cartridge.
- ❑ Dual speed tape turbo system programs can load up to 3 times faster than commercial turbos –thats over 10 times normal Commodore speed.
- ❑ Freeze the action then view the program with the monitor feature. Add pokes for infinite lives etc. Then Restart the game or backup – ideal for customised versions of your games.
- ❑ Special compacting techniques. Each program is saved as a single file.
- ❑ Transfers multistage tape programs to disk – more than any other cartridge – even the extra stages are turbo load – a unique feature.
- ❑ Sprite Killer! make yourself indestructible by disabling Sprite collisions in games.
- ❑ Picture Save. Save any multi-colour Hires screen to disk or tape. Compatible with Blazing Paddles, Koala, Slideshow etc.
- ❑ Fully compatible with 1541, 1541C, 1570, 1571, and enhancer or any CBM compatible data recorder.
- ❑ For C64, 64C, 128, 128D (in 64 mode).
- ❑ Unique Sprite Monitor. Freeze the Action and view all the Sprites, watch the animations scroll across the screen. Save Sprites to disk or tape. Customize your games by loading Sprites from one game to another – then restart the program or make a backup.
- ❑ Compatible with fast DOS and Turbo ROM systems.
- ❑ Backup process in turbo speed – faster than any rivals.
- ❑ Fast disk format (20 secs).
- ❑ Built-in Unstoppable reset button.

FASTLOADER

Action Replay III even has a built in disk fast loader which speeds up loading 5 times. Uses no memory – invisible to the system. **You could pay £20 alone for this feature.**

PERFORMANCE GUARANTEE

100% SUCCESS? RIVAL CLAIMS? WHO'S KIDDING WHO?
*Action Replay Mk 3 will backup any program which any other cartridge can backup – and more! It also has an unmatchable range of features. Consider 'Freeze-Frame' for example, which uses more disk space, saves at slower speed, has slower tape loader, has no built in disk fastloader, no picture, Sprite or restart features and costs £10 more than Action Replay. So who's kidding who? Buy Action Replay Mk 3. If you find that it does not live up to our claims return it within 7 days of receipt and your money will be refunded.

SEE DISKMATE AD FOR COMBO OFFER

ACTION REPLAY ENHANCEMENT DISK

Extending Action Replay's capabilities even further, this disk, contains a collection of tape to disk routines for a few newer games which load subsequent parts in a non-standard way. All the latest titles are catered for – more than any competing utility, and unlike other systems, ACTION REPLAY LOADS EXTRA SECTIONS AT TURBO SPEED. Disk includes file copy, disk backup and other useful utilities. Regular updates at low cost for use with Action Replay only. **Disk £7.95.**

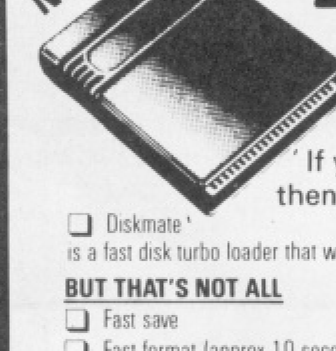
GRAPHICS SLIDESHOW SOFTWARE

Cartridge based backup systems usually destroy loading pictures WITH ACTION REPLAY. Multicolour pictures from games, graphic packages or loading screens can be saved to disk using Action Replay and viewed singly or in sequence with this sophisticated slideshow package. Turboload throughout. Sixteen pictures per disk. Joystick/keyboard control. An interesting new use for your computer.
Disk £4.95.

SPECIAL!! ENHANCEMENT DISK AND SLIDESHOW TOGETHER **ONLY £11.99**

NEW

Disk Mate II (TM)



DISK UTILITY CARTRIDGE

only £14.99 POST FREE

Built-in Reset Switch

If you have a disk drive then you **need** a Diskmate!!

❑ Diskmate'
is a fast disk turbo loader that will speed up your normal loading software by 5 times.

BUT THAT'S NOT ALL

- ❑ Fast save
- ❑ Fast format (approx 10 seconds)
- ❑ Improved single stroke DOS commands ie. load, save, directory, scratch, etc.
- ❑ Redefined function keys: ie. load, load/run, list, directory, monitor, etc.
- ❑ Powerful toolkit commands: ie. old, delete, merge, copy, append, autonum, linesave etc., etc.

PLUS A powerful machine code monitor/disassembler. All the usual monitor commands: assemble, disassemble, move, find, compare, fill, number conversion etc., etc. **NB.** This is a full monitor, not a token effort like some available.

✱ Diskmate incorporates special switching techniques which make it "invisible" to the system. Therefore the fastload will work with more software than other types. In addition this makes the other commands including the monitor more powerful. For instance the monitor 'floats' and is able to look under ROMs and even under itself!

SPECIAL OFFERS

Buy Action Replay III and Diskmate together on the same cartridge for only.... This must surely be the most powerful cartridge available for the Commodore	£39.99 POST FREE
Buy Action Replay III and Fast Hack'em for....	£44.99 POST FREE
Buy Action Replay III and Diskmate II on the same cartridge plus Fast Hack'em for....	£54.99 POST FREE

Diskmate II was designed by Datel and the programming is by Dosoft. Need we say more?

IT'S HERE... **AMERICA'S BEST SELLING DISK BACKUP SYS**
NOW AVAILABLE IN THE UK!

FAST HACK'EM (TM)

FOR THE COMMODORE 64/128

A MULTI-MODULE SYSTEM - ALL ON ONE DISK

£19.99

FAST HACK'EM IS QUITE SIMPLY THE BEST DISK COPYING SYSTEM AVAILABLE, ANYWHERE AT ANY PRICE.

SIMPLE TO USE FULLY MEN

SINGLE 1541 MODULE

- AUTO NIBBLER: Copy an entire protected disk in 3 minutes. Automatically senses type of protection and treats it as normal data to produce working copy
- NIBBLER: Copy and entire disk in 2 minutes. As above but parameters can be set manually
- FAST COPY: Copy a disk in under 2 minutes
- FILE COPY: Copy and file in 5 seconds
- FAT TRACKER: Fat tracks are amongst the latest forms of protection. This mode allows you to produce a fat track on the disk

SINGLE 1571 DRIVE (64 OR 128 MODE)

- FAST COPY: Entire 1571 disk in under 1 minute
- SINGLE OR BOTH SIDES: Will copy C64 or true 128 software
- C64 or 128 Modes

****WARNING****
FAST HACK'EM IS A VERY EFFEC
PRODUCT DESIGNED TO ENABLE
TO MAKE BACK UP FOR THEIR O
USE – DATEL IN NO WAY COND
SOFTWARE PIRACY.

**BECAUSE FAST HACK'EM IS PRODU
THE U.S. IT WILL ALWAYS BE ON T
THE LATEST PROTECTION TECHNI
SINCE MANY OF OUR LATEST PROG
APPEARED IN THE U.S. MANY MON**

TWIN 1541 DRIVES MODULE

- AUTO NIBBLER: Copy an entire protected disk in under 1 minute. Features auto track/sector analyzer.
- FAST COPY: Copy entire disk in 36 seconds with verify.
- AUTOMATIC FASTCOPY: As above but with completely automatic operation. In fact once set up doesn't even need the computer. A must for duplicating disks on a large scale.

1541 PARAMETERS MODULE

This is the module that gives Fast Hack'em its power. The parameters module contains dozens of "Parameter Keys" that a used to unlock those heavily protected programs. Each parameter is designed for a particular software brand or even a particular program. Other copy programs may make strong claims, but without special parameters they just can't cope. Da will be offering updates to Fast Hack'em on a quarterly basis, featuring 20-50 new parameters plus other improvements a they're made. Prices to be £6 plus old disk.

SPECIAL OFFER! QuickShot II ONLY **£6.99** or for C16 including **£8.99**

TRIDGE

ION...

EPLAY

NEW

Mk III

RSIÓN

ASTLOADER

Replay III even has
t in disk fast loader
speeds up loading
es. Uses no memory
sible to the system.
ould pay £20 alone
is feature.

ARANTEE

S KIDDING WHO?

SOFTWARE

ACKUP SYSTEM

£19.99

WARNING**

£8.99

rear on your expansion port: 3 slot
board for 64/128

ONLY £16.99
POST FREE

- ACCEPTS 3 CARTRIDGES
- SWITCH IN/OUT ANY SLOT
- ON BOARD SAFETY FUSE
- HIGH GRADE PCB/CONNECTORS
- RESET SWITCH

ABLE NOW!!

Now a full Midi Interface for your 64/128 at a realistic price! POST FREE

NOW ONLY
£24.99



- MIDI IN
- MIDI THRU
- 2x MIDI OUT
- Compatible with most leading software packages:-

• Advanced Music System • JMS • SEIL, etc.

Special Offer! Buy Midi Interface + advanced music system only £49.99 + £2 postage (disk only).

COMPUTER DATA RECORDER

ONLY
£24.99
POST FREE



- QUALITY COMMODORE COMPATIBLE DATA RECORDER.
- PAUSE CONTROL
- COUNTER.
- SUITABLE FOR 128/64.
- ALSO AVAILABLE FOR: C16/PLUS 4 PLEASE ADD £1.00.
- SEND NOW FOR QUICK DELIVERY.

MODEL + ROBOTIC CONTROL MADE EASY WITH ROBOTEK 64

£39.99 POST FREE

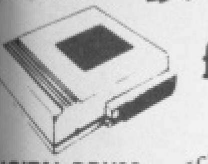
Robotek 64 is a comprehensive hardware/software package to interface your 64 to the outside world, models, robots, lighting, sensors etc., etc. The features make Robotic 64 the most sophisticated unit available at any price.
• 4 output channels each with on board relay. • 4 digital inputs fully buffered. • Analogue input with full 8 bit conversion.
• Sound input for voice recognition and voice controlled switching.
Software features: sequencers to control output. Analogue measuring module. Test Program. Voice Activation Module, much more. Voice recognition software to be released soon.
Total package no more to buy!

COM-DRUM

DIGITAL DRUM SYSTEM

ONLY
£29.99
POST FREE

SPECIAL OFFER AUDIO/TV LEAD (WORTH £4) FREE!!



Now with the Com-Drum digital system you can produce studio quality drum rhythms with real drum sounds. All the features of systems 10 times the price.

• A complete digitally recorded drum kit, i.e. 8 voices – kick drum, snare, tom-tom, hi-hat, cymbal etc. etc. N.B. these are real drum sounds – not synthesized.
• Real time and step time sequences • Full editing system. • 16 Alternative voices supplied free.
• 8 pre programmed rhythms to start you off.
• External sync facility. • Very simple to use.
• Line output to hi-fi amp or through TV with optional audio TV lead (see offer). • On screen menus. • Stylish case. • Please state tape or disk software.

COM-DRUM EDITOR

Enables you to construct your own drumkits. 24 Drum sounds supplied on disk which you can arrange yourself to make custom kits. Names are then added and saved as a complete set for use in the Com-Drum. Existing kits as supplied with Com-Drum can also be editing to your choosing. Available on Disk only £4.99 post free.

NEW Turbo Rom II

Replacement Kernal
New upgraded routines! PLUS
Fast Format
Fast Save

POST FREE! £14.99



Turbo Rom actually fits inside your computer and replaces the normal slow Kernal Rom with superfast disc loading routines, plus extended DOS commands.
• Loads most programs at 5-6 times speed
• Improved single key commands
• Fits inside computer so all ports are free
• Return to normal kernal at flick of switch
• Fitted in minutes – no soldering usually needed (on a few C64's the old Rom may have to be de soldered)

Turbo Rom I can be upgraded for £5 plus old chip.

NEW smart cart

An 8K or 32K pseudo ROM cartridge

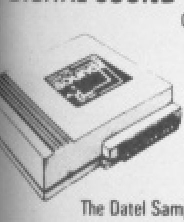
£14.99 8K version
£29.99 32K version



Now you can have a cartridge that you program as if it were computer RAM then acts as if it were ROM.
- Battery backed to last for upto 5 years (lithium battery). Simply load in the program and flick the switch. The cartridge can be removed and will retain the program just like ROM.
- Make autostart cartridges without the need for an EPROM burner.
- Can be switched on/off board from keyboard.
- 32K version offers 4 x 8K pages under software switching.
- Some knowledge of m/c is required but full instructions included.

DIGITAL SOUND SAMPLING

COMPLETE PACKAGE
£49.99
POST FREE



FREE AUDIO (TV LEAD!)

NOW FOR YOUR COMMODORE 64

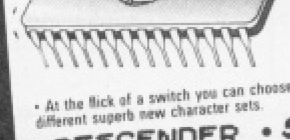
The Datel Sampler now brings you this technology at a sensible price!

• The Sampler allows you to record any sound digitally into memory and replay it instantly at any pitch, backwards, forwards, ascending scale, descending, with echo, reverb, flanging, endlessly looped etc. Truly professional hardware incorporating:
•Full 8 bit D and ADC conversion
•Line or MIC input, line output and feedback control
•A comprehensive software package including:
•A live effects menu with echo, reverb, digital delay, etc.
•Full sample editing facilities with review and on screen frequency plotting
•A powerful real time sequencer

Copy Drum Software available separately at £9.99 to turn your sound sample into a Com-Drum system as well as a sampling system.

TURN YOUR MPS 801 INTO 4 PRINTERS IN ONE!

PRINTER IV
ONLY POST FREE £19.99



Alternative character Rom fitted in minutes – no soldering required.

Each set has true descenders.
All 4 sets can be mixed within one document.
Printer IV is a direct replacement for the normal printer ROM so it is 100% compatible with your existing software Graphics – No Problem either.
SEND NOW FOR QUICK DELIVERY

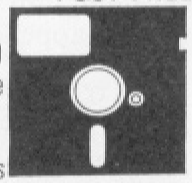
" For anyone who uses their printer often this chip is a must. It's quick and easy to use and the end results are impressive. YOUR COMMODORE Jan. '87. "

• At the flick of a switch you can choose between any of 4 different superb new character sets.

DESCENDER • SCRIBE
ECLIPSE • FUTURE

IT'S BACK TOOLKIT IV

ONLY £9.99
POST FREE



THE ULTIMATE DISK TOOLKIT FOR 1541/1540

Toolkit IV has, for some time, been generally recognised as the best disk toolkit available. The only problem for Datel was that it was distributed by someone else!! So when the opportunity to obtain the rights came our way, we jumped at it. And what's more, in keeping with our general pricing policy, we are offering it at less than half the previous selling price. A disk toolkit is an absolute must for the serious program hacker and TOOLKIT IV has more features than most for less:

DISK DOCTOR V2 – Read and write any track and sector including extra and renumbered tracks. Repair damaged sectors. Look underneath read errors.

HEADER/GAP EDITOR – Decodes and display: ALL header information including off bytes and header gap. Rewrite the entire header and header gap. Renumber sectors. Also edit any sector tail gap.

FAST DISK COPY – Copy an entire disk in 2 minutes or less using single 1541.

FAST FILE COPY – Selective file copy. Works at upto 6 times normal speed.

FORMATTER – 10 second format an entire disk or format any individual track or half track 0 to 41. Redefine any of 30 parameters to create or recreate unique disk formats.

DISK LOOK – Sort directory. Recover lost files. Display file start/end addresses. Disassemble any file program directly from the disk to SCREEN or PRINTER including undocumented opcodes. Edit Bam. Much, much more.

FILE COMPACTOR – Can compact machine code programs by upto 50%. Saves disk space. Compacted programs run as normal.

ERROR EDIT – Quickly find and recreate all read errors including extra and renumbered tracks or sectors and half tracks from 0 to 41: even recreates data under errors and allows you to redefine any necessary parameters.

PLUS DISK DRIVE SPEED TEST, DISK ERASE, DISK DRIVE RAM MONITOR, DISK LOG, BASIC COMPACTOR/UNCOMPACTOR, FILE MAKER + MUCH, MUCH MORE.

TOOLKIT IV is an absolute must for the serious disk hacker. It has all the routines tha the others have plus all the ones they don't . . . there is no better product available at any price . . . available now complete with comprehensive instructions.

IT'S A COMPLETE LIGHTPEN SYSTEM . . . IT'S AN ALL IN ONE ILLUSTRATOR/GRAPHICS PACKAGE.

IT'S BLAZING PADDLES ILLUSTRATOR



DEALER ENQUIRIES WELCOME

Complete with the DATEL LAZERWRITER
An Advanced Lightpen featuring state of the art fibre optic technology.

ONLY £24.99 POST FREE
TAPE OR DISK (PLEASE STATE WHICH)

Yes Blazing Paddles is one of America's top selling graphics packages. Fully Icon/Menu driven, comes complete with the Datel Lazerwriter – A lightpen featuring the latest polymer fibre optic cable and sensor for pin point accuracy of a calibre simply not possible with-conventional system.... ....But that's not all – Blazing Paddles will also work with any standard input device including Joysticks, Touch Tablets, Paddles, Mice, Trackball and Professional Graphic Tablets

A SUPERB PACKAGE WITH ADVANCED FEATURES

- Advanced Colour Mixing to create over 200 textured hues
- Painting with a range of brushes
- Air Brush
- Ovals
- Rectangles
- Lines
- Rubberbanding
- Text Mode
- Fill
- Single Dot Mode
- Freehand Draw
- Shape Library
- Clear
- Printer Dump
- Hires Screens saved from Action Replay can be loaded and edited etc (Disk)

PLUS A zoom feature for single Pixel editing while viewing, the results at full scale. Powerful cut and paste facility, shapes can be picked up, moved around, repeated and saved. Full Load and Save feature for pictures, shapes and windows which are supplied.

If you think the Software you get with your Mouse/Graphtablet is a bit weak then you can buy Blazing Paddles Software alone. FOR ONLY £12.99 TAPE OR DISK (PLEASE STATE)
(Note conventional Lightpens cannot cope with the high Pixel resolution of Blazing Paddles – only Lazerwriter is suitable as a Lightpen input)



PADDLES ILLUSTRATOR IS FOR EVERYONE!

Using the Lazerwriter a child can use it as a colouring book or a computer artist can create superb graphics.

DATEL ELECTRONICS

USUALLY SAME DAY DESPATCH ON ALL ORDERS
SEND CHEQUES/P.O's TO:
UNITS 8/9
FENTON INDUSTRIAL ESTATE,
DEWSBURY ROAD, fenton,
STOKE-ON-TRENT TEL: 0782 273815
FAX: (0782) 264510

24-HR CREDIT CARD LINE
FOREIGN ORDERS ADD £2 POSTAGE

SEE US ON PRESTEL PAGE No. 258880000A
12 Page Catalogue + Order Page

Arcade Action

Get those characters moving with this latest routine in our programing series.

By Tony Crowther

Whatever the type of game you are aiming to write on your computer, you will no doubt need some type of background. This background can be made to stand out even more if sections of it are moving.

For example in a platform game you may have ladders that move up and down or conveyor belts that move left or right. In this installment, I will be giving a routine that makes this type of animation extremely simple.

At this stage of the proceedings I was about to spout forth into a discussion on user defined graphics and how you can design your own characters when the editor brought me to halt screaming that this was covered in last month's magazine (see Everymans Guide to Graphics). I will therefore miss this out completely and jump straight into the programs and some examples.

What to do

Let's suppose that you are writing a program that requires the use of some rotating shapes in the background. If you take a look at Figure 1 you will see a simple design for a few characters that would make up the different animations of a moving ladder. If in Basic you were to print one character on top of the other then you would be getting the feeling that the object, in this case a ladder was moving.

If you take a look at Figure 2 you will find a Basic program for the C64, that will place the characters from Figure 1 into memory and proceed to print them over the top of each other. OK so it is simple and isn't a really useful example but should give you an idea of how character animation is achieved. In this case we just happened to define a ladder.

Arcade Routines

The problem with using Basic for altering a displayed character is that it is an extremely slow process and no matter what else you do within the program you would need to keep jumping to the section of it that changes the character. If you take a look at last month's issue of *Your Commodore* and my discussion of interrupts, wouldn't it be easier to set up the character changing on an interrupt and leave the computer to handle it, thus leaving you free to control the rest of the program?

This is just what the program in Figure 3 will do. This is a Basic loader for a program that will animate a character on the screen on a Commodore 64 computer. If you want to see exactly how to program works then you can take a look at the assembly language for it in Figure 4.

The Character Animate program uses the Interrupt Database program that was published in last issue so you must make sure that this has been loaded into memory before attempting to run any of the program presented here.

Once you have RUN the Character Animate program it is extremely easy

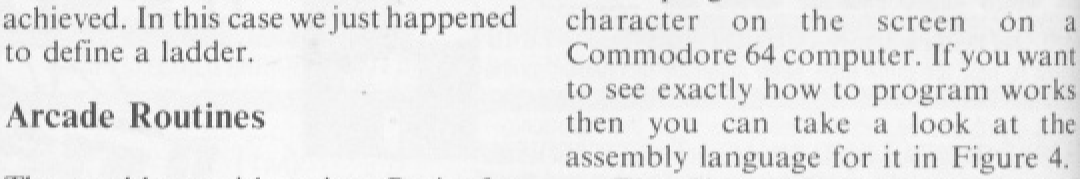


Figure 1

to use. All that is needed to set your characters changing is a simple SYS call followed by the data for the animations. The syntax for the command is:

SYS 49968, Char No. Data Pos, Animation Pos, Number of frames. Speed

Where:
Char No is the number of the character to be animated. Up to eight different characters can be animated on the screen and are numbered from 0-7. It may help if you think of the eight different characters as a type of sprite.

Data Pos is the character that is going to be altered in the range 0 to 127. 0 is the same as the character code 128 so 1 will be a character A etc.
Animation Pos: This is the position in the character table that the animation sequence starts. All of the characters that are used for an animation should be placed one after the other and stored in character positions 0-119.
No. of Frames is quite simple the number of changes that is to occur to the character.
Speed is quite simply the rate at which the changes are to take place. This can range from 1 to 255 with 1 being fast and 255 being slow.
Before the animations will start you will of course have to tell the Interrupt database that this routine is in use. This is quite simple achieved by the following command:

POKE 836,1

Don't forget that you also have to start the IRQ data base with a SYS 49152 instruction.

In Use

Figure 5 gives an example of how this program can be used. It is fully documented so you should have no problems figuring out how it works. The program quite simply POKEs a number of characters to the screen and proceeds to animate them all as rotating stars at different speeds. Again nothing clever but it does demonstrate the power of this routine and should give you some ideas.

The next installment in this series of useful programming routines will be to provide you with a routine that is another animation routine, but this time to animate the C64s sprites. YC

PROGRAM: BASIC ANIM DEMO

```
98  90 PRINT"[CLR]"
2C  100 A =12288:B =53248
5E  110 REM A=START OF CHARS IN RAM
39  120 REM B=START OF CHARS IN ROM
40  140 POKE 56334,0:REM STOP TIMER
C8  150 POKE 1,51:REM SWITCH IN CHAR
    ROM
3D  160 REM READ CHAR ROM INTO RAM
7C  170 FOR I=0TO512
53  180 POKE A+I,PEEK(B+I)
15  190 NEXT I
9D  200 POKE 1,55:REM SWITCH OUT CHAR
     ROM
37  210 POKE 56334,1:REM SWITCH ON TI
    MER    185 REM DATA FOR CHARACTER
    S
FB  220 DATA195,195,195,195,195,195,2
    55,255
0D  230 DATA195,195,195,255,255,195,1
    95,195
33  240 DATA195,255,255,195,195,195,1
    95,195
B6  260 FOR I =0 TO 23
EA  270 READ B
29  280 POKE A +520 +I ,B
88  290 NEXT I
AE  300 POKE53272,(PEEK(53272)AND240)
    +12
B3  310 REM NOW LETS PRINT OUR LADDER

70  320 LET A$="[RIGHT10]"
62  330 PRINT"[HOME]":FOR X=1TO10:PRI
    NTA$;"[SA]":NEXT:REM PRINT COLUMN
     OF SHIFTED-A
C7  340 REM NOW LETS PRINT OTHER CHAR
    ACTERS OVER THE TOP
DA  350 PRINT"[HOME]":FOR X=1TO10:PRI
    NTA$;"[SB]":NEXT:REM PRINT COLUMN
     OF SHIFTED-B
B0  360 PRINT"[HOME]":FOR X=1TO10:PRI
    NTA$;"[SC]":NEXT:REM PRINT COLUMN
     OF SHIFTED-C
CC  370 REM KEEP GOING AROUND LOOP
6A  380 GOTO 330
```

PROGRAM: CHAR ANIM

```
35  100 DATA162,0,134,255,32,253,174,
    32,1042
EE  101 DATA138,173,32,247,183,166,25
    5,165,1359
AB  102 DATA20,157,122,3,232,224,5,20
    8,971
D7  103 DATA233,169,123,141,94,192,16
    9,195,1316
97  104 DATA141,95,192,172,122,3,192,
    8,925
65  105 DATA176,32,173,123,3,153,143,
    3,806
1D  106 DATA173,124,3,153,159,3,173,1
    25,913
FF  107 DATA3,153,167,3,173,126,3,153
    ,781
1A  108 DATA151,3,169,1,153,175,3,153
    ,808
C5  109 DATA135,3,96,173,68,3,240,250
    ,968
B8  110 DATA162,0,254,127,3,189,127,3
    ,865
BC  111 DATA221,151,3,144,10,169,0,15
    7,855
ED  112 DATA127,3,189,175,3,208,3,76,
    784
E1  113 DATA251,195,254,135,3,189,135
    ,3,1165
D6  114 DATA221,167,3,144,5,169,0,157
    ,866
81  115 DATA135,3,169,0,133,251,189,1
    43,1023
03  116 DATA3,133,250,6,250,38,251,6,
    937
CE  117 DATA250,38,251,6,250,38,251,1
    65,1249
6C  118 DATA251,24,105,52,133,251,189
    ,159,1164
EC  119 DATA3,133,252,169,0,133,253,6
    ,949
09  120 DATA252,38,253,6,252,38,253,6
    ,1098
5B  121 DATA252,38,253,189,135,3,10,1
    0,890
BE  122 DATA10,133,254,165,252,24,101
    ,254,1193
B5  123 DATA133,252,165,253,105,48,13
    3,253,1342
FA  124 DATA160,0,177,252,145,250,200
    ,192,1376
85  125 DATA8,208,247,232,224,8,176,3
    ,1106
DA  126 DATA76,130,195,96,169,123,141
    ,97,1027
2B  200 POKE 53280 ,0
29  201 POKE 53281 ,0
5C  202 PRINT"[CLR,C5]"
40  203 A$= "[SPC6]"
1A  204 PRINTA$"*********************
```

```
    *****"
01  205 PRINTA$"*[SPC24]*"
A7  206 PRINTA$"*[SPC3]CHARACTER ANIM
    ATION  *"
DF  207 PRINTA$"*[SPC5]MEM.49968-5017
    9[SPC4]*"
06  208 PRINTA$"*[SPC24]*"
B8  209 PRINTA$"* POKE 836 ,1[SPC12]*
    "
28  210 PRINTA$"*[SPC24]*"
09  211 PRINTA$"* SYS 49968 ,CHAR N[S
    W].[SPC4]*"
68  212 PRINTA$"*[SPC11],DATA POS.[SP
    C3]*"
0A  213 PRINTA$"*[SPC11],ANIM POS.[SP
    C3]*"
D4  214 PRINTA$"*[SPC11],N[SW].OF FRA
    MES*"
E6  215 PRINTA$"*[SPC11],SPEED[SPC7]*
    "
2E  216 PRINTA$"*[SPC24]*"
75  217 PRINTA$"*********************
    *****"
4C  300 LI =100 :FOR I = 49968 TO 501
    79 STEP8 :T =0 :FOR J =0 TO 7 :RE
    AD A
E6  301 POKE I+J ,A:T =T +A :NEXT J:R
    EAD A:IF A<>T THENPRINT"ERROR IN
    LINE "LI :END
05  302 LI =LI +1:NEXT I
```

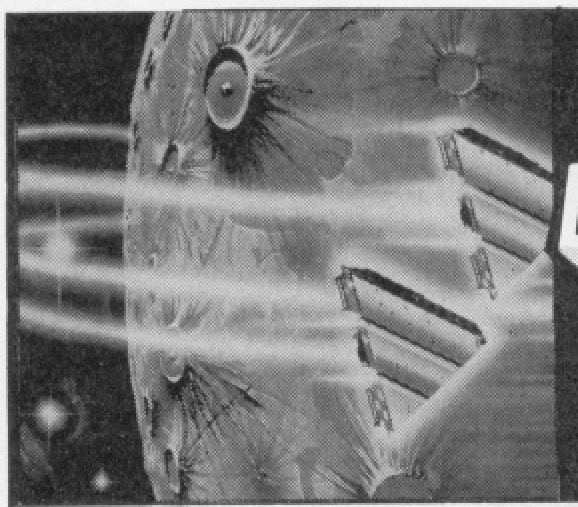
PROGRAM: CHAR ANIMATE

```
1000 ;******************************
1010 ;****    ANIMATE CHAR      ****
1020 ;******************************
1030 ;
1040 ;HOW TO USE
1050 ;    BASIC          :    M/C
1060 ; -------------- : ----------
1070 ;                  :
1080 ;SYS49968,XX1,XX2,: LDA #XX1
1090 ;XX3,XX4,XX5      : STA 890
1100 ;                  : LDA #XX2
1110 ;( XX* ARE DEALT  : STA 891
1120 ; WITH IN TEXT     : LDA #XX3
1130 ; OR SEE BASIC     : STA 892
1140 ; LOADER.)         : LDA #XX4
1150 ;                  : STA 893
1160 ;                  : LDA #XX5
1170 ;                  : STA 894
1180 ; POKE 836,NO      : LDA #NO
1190 ; (SET UP IN IRQ   : STA 836
1200 ;  DATA BASE.)     : JSR 49995
1210 ;
1220 ; NO = 0 OR 1   1=ON  0=OFF
1230 ;
1240 ;******************************
1250 ;
1260 PAGE = 250
1270 JUMPTB = 49246 ;JMP TABLE
1280 FLAG = 836
1290 BASIC1 = 44797
1300 BASIC2 = 44426
1310 BASIC3 = 47095
1320 PAGE1 = 20
1330 FLAG1 = 890
1340 COUNT = 895
1350 FLAG2 = 903
1360 FLAG3 = 911
1370 FLAG4 = 919
1380 FLAG5 = 927
1390 FLAG6 = 935
1400 FLAG7 = 943
1410 * = 49968
1420 ;
1430 ;
1440 PROG1
1450  LDX #0
1460 LOOP12
1470  STX PAGE+5
1480  JSR BASIC1 ;GET 3 NUMBERS
1490  JSR BASIC2
1500  JSR BASIC3
1510  LDX PAGE+5
1520  LDA PAGE1
1530  STA FLAG1,X
1540  INX
1550  CPX #5
1560  BNE LOOP12
1570  LDA #<PROG2 ;CHAIN PROG2 TO IRQ
1580  STA JUMPTB
1590  LDA #>PROG2
1600  STA JUMPTB+1
1610  LDY FLAG1
1620  CPY #8 ;CHECK BIGGER THAN 8
1630  BCS LOOP5
1640  LDA FLAG1+1 ;SET NEW FLAGS
1650  STA FLAG3,Y
1660  LDA FLAG1+2
1670  STA FLAG5,Y
1680  LDA FLAG1+3
1690  STA FLAG6,Y
1700  LDA FLAG1+4
1710  STA FLAG4,Y
1720  LDA #1
1730  STA FLAG7,Y
1740  STA FLAG2,Y
1750 LOOP5
1760  RTS
1770 ;
1780 PROG2
1790  LDA FLAG ;CHECK ON/OFF FLAG
1800  BEQ LOOP5
1810  LDX #0
1820 LOOP1
1830  INC COUNT,X ;SPEED OF CHANGE
1840  LDA COUNT,X
1850  CMP FLAG4,X
1860  BCC LOOP10
1870  LDA #0 ;RESET COUNT
1880  STA COUNT,X
1890  LDA FLAG7,X ;ON OR OFF
1900  BNE LOOP4
1910 LOOP10
1920  JMP OUT2
1930 LOOP4
1940  INC FLAG2,X ;INC ANIMATION
1950  LDA FLAG2,X
1960  CMP FLAG6,X ;CHECK WITH
1970  BCC LOOP6 ;ANIMATION MAX.
1980  LDA #0 ;RE-SET ANIMATION
1990  STA FLAG2,X
2000 LOOP6
2010  LDA #0
2020  STA PAGE+1
2030  LDA FLAG3,X ;CHAR TO CHANGE
2040  STA PAGE
2050  ASL PAGE ;MULTIPLY BY 8
2060  ROL PAGE+1
2070  ASL PAGE
2080  ROL PAGE+1
2090  ASL PAGE
2100  ROL PAGE+1
2110  LDA PAGE+1 ;ADD 13312
2120  CLC
2130  ADC #52
2140  STA PAGE+1
2150  LDA FLAG5,X
2160  STA PAGE+2 ;POSITION OF
2170  LDA #0 ;ANIMATIONS
2180  STA PAGE+3
2190  ASL PAGE+2 ;MULTIPLY BY 8
2200  ROL PAGE+3
2210  ASL PAGE+2
2220  ROL PAGE+3
2230  ASL PAGE+2
2240  ROL PAGE+3
2250  LDA FLAG2,X ;ANIMATION POS =
2260  ASL A ;FLAG2 * EIGHT
2270  ASL A
2280  ASL A
2290  STA PAGE+4
2300  LDA PAGE+2
2310  CLC
```

```
2320  ADC PAGE+4
2330  STA PAGE+2
2340  LDA PAGE+3
2350  ADC #48 ;ADD 12288
2360  STA PAGE+3
2370 LOOP8
2380  LDY #0
2390 LOOP9
2400  LDA (PAGE+2),Y ;LOAD NEW DATA
2410  STA (PAGE),Y ;STORE IN CHAR
2420  INY
2430  CPY #8 ;DO ALL 8 BYTES
2440  BNE LOOP9
2450 OUT2
2460  INX
2470  CPX #8 ;DO ALL 8 CHARS
2480  BCS OUT1
2490  JMP LOOP1
2500 OUT1
2510  RTS
2520 .END
```

PROGRAM: CHAR ANIM DEMO

```
2A  0 A =12288 :B =53248
F6  1 SYS 49272:REM SWITCH OFF THE IR
    Q
D4  2 POKE 56334 ,0:REM STOP TIMER
67  3 POKE 1 ,51   :REM SWITCH IN CHA
    R ROM
E8  4 FOR I =0 TO 512
20  5 POKE A +I ,PEEK( B +I )
ED  6 NEXT I
F7  7 POKE 1 ,55
AA  8 POKE 56334 ,1:REM DATA FOR ANIM
    ATIONS
46  9 DATA 24,24,24,255,255,24,24,24
98  10 DATA 48,48,55,31,248,236,12,12
67  11 DATA 0,102,110,56,28,118,102,0
0D  12 DATA 4,78,236,120,30,55,114,64
4F  13 FOR I =0 TO 31
EB  14 READ B
D2  15 POKE A +512 +I ,B
FB  16 NEXT I
7F  17 A$(1) ="[WHITE,S*]"
FA  18 A$(2) ="[C8,SA]"
FF  19 A$(3) ="[C4,SB]"
D9  20 A$(4) ="[C5,SC]"
3D  21 FOR I =0 TO 128 :REM BLANK OFF
    CHARS
0A  22 POKE A +1024 +I ,255
FC  23 NEXT I
3A  24 POKE 53281 ,0
38  25 POKE 53280 ,0
B4  26 POKE 53272 ,29:REM SWITCH INTO
    U.D.G.
59  27 PRINT"[CLR]"
A0  28 FOR I = 0 TO 399 :REM PRINT ON
    SCREEN
0D  29 R = INT( RND( 1 ) *4 +1 )
54  30 PRINT A$( R) ;
F4  31 NEXT I
FB  32 SYS 49152   :REM IRQ ON
B4  33 POKE 836 ,1 :REM SWITCH ON OR
    OFF
56  36 P =0
B5  37 PRINT"[HOME,DOWN13]  [C5,SPC8]
    CHAR ANIMATION DEMO"
13  50 A =INT( RND( 1) *16 )
BE  51 B =INT( RND( 1) *400 )
1C  52 C =RND( 1) *200
07  53 POKE 1064 +B ,A +128:REM RANDO
    M CHAR
7F  54 P =P +1
A2  55 IF P <10 THEN 50
6A  56 P =0
D4  57 REM  SET UP THE ANIMATION
2D  58 SYS 49968,A/2,A,64,4,A/2
17  59 GOTO 50
```



TRILOGIC

LIMITED PERIOD ONLY! ACT NOW!

SPECIAL ANNIVERSARY CELEBRATION PRICE!!!

ONLY AVAILABLE FROM US AT THIS PRICE

Now ONLY £29.99 (inc VAT) POST FREE

the expert WITH ESM

MUCH MORE THAN JUST A BACK-UP UTILITY



JOIN THE INDEPENDENT INTERNATIONAL EXPERT USER CLUB.

CAN IT DO ALL THIS?

IT ALSO . . .

- SAVES PROGRAMS IN ONE FILE – *(excl multipart ones)*
- COMPACTS PROGRAMS *used by leading software houses.*
- RELOADS, DECOMPACTS & RUNS ANY PROGRAM WITHIN 35 secs.
- THE EXPERT IS NOT NEEDED FOR RELOADING.
- COMPATIBLE WITH THE PHANTOM, & ALL CBM64/128 DISK DRIVES.

WITH THE *NEW* V2.10 SOFTWARE SUPPLIED, THE EXPERT CAN DO ALL THIS AND MORE.

1. **PROGRAM PARALYSER** — Stops even the most heavily protected programs and defeats All "anti-freeze" techniques.

\+

2. **BACK-UP GENERATOR** — TAPE – DISK, DISK – TAPE, DISK – DISK, TAPE – TAPE Transfers memory resident programs whether loaded from disk or tape.

\+

3. **SPRITE EXTRACTOR** — Displays the sprites for you to edit, and then save, or RESTART the game using your customised ones. You can view the animation too.

\+

4. **SPRITE IMMORTALISER** — This feature disables the sprite collision detection – prolongs active sprites . . .

\+

5. **HIRES SCREEN GRABBER** — Save a HIRES screen and then alter it using one of several utilities widely available.

\+

6. **CHEAT MACHINE** — The easy way to enter cheats and "pokes". Gain extra lives, or infinite energy etc etc.

\+

7. **CODE INTERROGATOR** — A truly professional machine-code monitor, operating over all 64K Ram, with disassemble, compare, transfer, fill, assemble, hunt, search, modify, jump, number conversion commands etc. PLUS, B command lists BASIC & R restarts a program.

AND IT'S . . . .

8. **THE ONLY PROGRAMMABLE CARTRIDGE** — You'LL NEVER need to return the cartridge for upgrading. – simply send for the latest software – only £2.00 exchange disk or tape. We calculate that you could buy an EXPERT and several upgrades for what it will cost you to upgrade rival products.

FOR THE 64 & 128 (64 MODE)

EXPRESS DELIVERY ADD £1.95

NEW THE EXPERT UTILITY DISK No.1
- Specific multi-part back-up utilities.
- Additional operating systems.
- Fast file copier etc. etc.
- Monitor with print command.

ONLY £5.95

UPGRADES

Existing EXPERTers can send for the latest V2.10 operating software as detailed in this ad for £3.50 handling charge, or £2.00 + your current disk/tape (must be in good condition).

THE EXPERT ORDER

Please send me Expert ESM — SPECIFY DISK ☐ OR TAPE ☐

Name ______________________

Address ______________________

____

____

If you do **not** have a disk drive please state "Tape version required."

I Attach P.Order/cheque **£29.99**

Access No. ______________________

Post off to ►Trilogic Dept YC; 29 HOLME LANE BRADFORD BD4 0QA

- FAST MAIL ORDER SERVICE ● PROMPT DESPATCH
- ALL PRICES FULLY INCLUSIVE PLUS 10 DAY MONEY BACK GUARANTEE ON ALL BACK-UP DEVICES.

ORDERING: WRITE OR 'PHONE/
PAYMENT BY CASH, CHEQUES PAYABLE TO TRILOGIC/ BY POSTAL ORDER OR ACCESS ● ADD £1 EXTRA FOR EXPORT ORDERS. PAYMENT IN STERLING ONLY PLEASE

10 DAY MONEY BACK GUARANTEE!!

TRILOGIC

Tel (0274) 684289

CALLERS 329 TONG STREET BRADFORD BD4 9QY

- TAPE BACK-UP UNITS
- DCL1
- DCL4
- DCL4A

- MONITOR LEADS . . .
- 64 TO FERGUSON
- 64 TO PHILIPS
- 64 TO HITACHI
- 64 TO FIDELITY
- 64 TO SONY

RGBI INTERFACES . . .
128 TO FERGUSON
128 TO FIDELITY
128 TO PHILIPS
128 TO HITACHI
128 TO SONY

RESET SWITCHES

CONSUMABLES . . .
- PRINTER RIBBONS
- PRINTER PAPER
- PRINTER LABELS
- DISKS & TAPES

- MISC ITEMS . . .
- DISK BOXES
- JOYSTICKS

- NEW PRODUCTS . . .
- MAINS CONTROLLERS
- RELAY OUTPUT UNIT
- CBM 64 POWER UNIT

- MORE – OPPOSITE 18p sae FOR DATA.

Oxford Basic

A new package from Systems Software to take the drudgery out of Basic programming.

By Stuart Cooke

A craftsman of any type would be lost without a decent range of tools. A programmer too will find life a lot easier if he holds a collection of programming tools designed to make programming easier.

Systems Software has produced a package, entitled *Oxford Basic*, that provides a Basic programmer with an excellent selection of programming utilities.

The package contains four major programs. These are, a compiler to speed up execution of Basic programs, a toolkit providing the user with seven useful commands, a compressor to reduce the amount of space that a program takes up and an analyser that produces a list of important program information.

Getting Started

Unlike many other program houses, Systems Software does not put any protection on programs. This means that you can make copies of any programs that you want to use and place them on the relevant disk.

However, before you can start any program you must enter a series of colour codes. These vary every time the program is used and are found on a coloured grid of 27*40 dots. Some people don't like this type of protection as it is time consuming finding the codes every time the program is to be used. Personally I don't mind it, the fact that you can make a backup of expensive software is much more important to me.

Probably the best way to deal with this package is to take a look at each section in turn.

Ox-Comp

This section of the package is a Basic compiler. In essence this takes a Basic program and turns it into machine code generating a program that will RUN much faster than the original Basic version.

Before you can use the compiler for the first time you must set yourself up with a series of work disks. These should consist of a disk containing the compiler and one containing a set of compiler utilities.

Compiling a program is extremely easy. All you have to do is RUN the OX-COMP program and when requested enter the filename of the Basic program to be compiled. The program will then do the rest.

OX-COMP isn't totally compatible with C64 Basic, though the differences shouldn't cause anyone too many problems. Perhaps the major difference between normal Basic and OX-COMP is with arrays.

OX-COMP does not allow you to use three dimensional arrays within your program. However if you do have a program that uses this type of array then there is help to hand. One of the OX-COMP utilities, PRE-SCAN, will go through a program and change all three dimensional arrays to 2D.

OX-COMP also needs to know, at compile time, the dimensions of all arrays. Therefore you can't use a parameter as the dimension of an array, you must use a constant. This shouldn't cause any problems if you dimension the array to the maximum size you expect to need.

Other commands not allowed in OX-COMP are LIST, CONT and SAVE.

Programs that are to be used by OX-COMP can make use of extra commands that the package provides.

User defined string and mixed functions are allowed.

Integer FOR/NEXT loops are allowed. This gives a slight speed advantage when the program is used.

When writing a normal Basic program only the first two characters of any variables are taken into consideration, for example, DEVICE and DEVELOP would be the same as far as Basic is concerned. With OX-COMP you can force the compiler to recognise every character of a variable name, in the above example the two variables would be different.

Simple commands are also included to enable and disable the STOP key.

Before you can compile any program it is important that you check

for errors. Since a machine code program doesn't have any line numbers, if an error occurs while running a compiled program, it isn't easy to sort out exactly where in the original Basic program the error is. A utility program is provided so that, if your compiled program stops with an error, you can find out at which program line this occured. It's now up to you to get out the original Basic program, find and solve the problem and then re-compile the program.

If you are a good Basic programmer but don't want to start learning machine code then this compiler will be an extremely powerful tool, you can write your programs easily, make sure they work and then use the compiler to speed things up.

Analyzer

When you write a Basic program it is very difficult to remember if you have used a specific variable or whether you have some lines from an earlier version of the program that are no longer needed. ANALYZER produces reports on the specified Basic program allowing you to check the program thoroughly.

Once the ANALYZER has 'looked' at the program specified, a menu is produced showing the various options available.

The first option is to produce a 'Flow cross reference'. This is a list of all lines that are accessed by a GOTO or GOSUB statement followed by the lines that call them. This is useful if you are trying to trace a program through.

The 'Data cross reference' option produces a list of all the variables, arrays and functions that are used within a program. Again a list of the lines where they are used follows the variable name. This option is great if you are trying to find out just what variables are being used. It also helps when you want to make sure that you haven't used the same variable for more than one purpose, an extremely common programming fault.

An interesting option is that of 'dead wood analysis'. This produces a list of all the lines that are in a program that will never be reached. If a program has undergone many modifications it is not unusual for program lines to become redundant, this option allows you to see just which lines are no longer used. This is also useful when debugging a program as it allows you to check if a certain section of the program is being reached.

One nice feature of the 'Dead Wood' option is the fact that ANALYZER will strip these lines from the program and SAVE the new version out to disk.

If you want to improve on the execution speed of any program, placing all of the variables in the first lines will help. The Generate Header File option will create a file that sets up all of the variables in your program. This can then be added to your program with the MERGE function of the toolkit.

The final option of this section of the package is the ability to print out information about the file. Information provided is the length of the program, how many variables that you have used, the arrays that you have used and how many lines, GOTOs, GOSUBs, variables and arrays are in the program.

Compressor

When you have generated what you think to be the most effective Basic program by using the ANALYZER to strip unwanted lines and created a header for the program, there will no doubt be further ways of improving the operation and saving space. The compressor helps with this as it removes all unnecessary spaces and REM statements from the program. It then packs as many statements as possible on to each program line and then finishes by renumbering the program. This results in a much smaller Basic program that will usually RUN a little bit faster.

Do make sure that your program is bug free before you use this type of program since it is impossible to debug a compact program.

Toolkit

This program merges itself into an area of the C64's memory which is not in use when writing Basic programs. Once this has been done the Basic language on your C64 has a further eight commands added to it. If you already own a programmer's toolkit then this may not seem to offer many commands, however, the commands are the ones that I find myself using most of the time from the larger packages.

The commands available are:

FIND: this is used to search through a specified program range for a specific string of characters. you could for example list all the lines in the program that contain the string PRINT or specify that you want all of the lines from 1000 onwards that contain a PRINT statement.

CHANGE is a modification of the above command as it also searches as specified for a specific string. The modification is that this command allows you to then change the string into a new one. For example you may change all of the PRINT statements between lines 500 and 1000 into PRINT 1.

DUMP will display a list of all the variables used in a program and their values. This is an extremely useful command to have when trying to debug a program since you can look at the state of each variable.

INFO is similar to the Basic FRE command as it gives you statistics on the program in memory. INFO is greatly expand from the usual FRE statement since it not also gives the amount of free memory but many other parameters as well. Data produced by this command is:

1) The number of bytes occupied by Basic.
2) The number of bytes used by variables.
3) The number of bytes used by arrays.
4) The number of bytes used by strings.
5) The number of bytes free excluding variables etc.
6) The number of free bytes including variables etc.

As you can see, quite a comprehensive range of information.

MERGE allows you to merge programs together. This is very useful if you have a library of subroutines, such as ones to read the joystick or produce sounds. You can MERGE this into any program that you are writing and it will save you from rekeying all of the program again. The

only real problem with this command is that it is up to you to make sure that the programs to be MERGEd do not have any line numbers that are the same.

RENUMBER as its name suggests, allows you to RENUMBER the program lines. This RENUMBER takes care of all GOTOs GOSUBs etc. as well as allowing you to specify if you only want to RENUMBER certain areas of the program.

DELETE simply erases the specified range of lines from a program.

TYPE allows you to read the contents of the specified file on screen. This is exceptionally useful if you want to examine the contents of a SEQ file say from a database or wordprocessor.

SIZE will give you the program size of any a specified file on disk.

As I have already stated, the range of commands presented is not great but the ones that are available are all extremely useful and no Basic programmer should be without them.

Verdict

Oxford Basic offers the user a sophisticated and extremely useful range of utilities. There isn't such a thing as a perfect piece of software and Oxford Basic is no different.

Probably, my main gripe about the package is that in the routines that are asking for a file from disk you are not able to get a directory and check the files on disk. For example say you want to compile a program called FRED/1 you could enter this only to find that the file isn't on the disk in the drive. Without a directory option you have to stop the compiler program, LOAD the directory, list it to the screen, to find your program is really FRED.1, and then re-load the compiler, go back through the protection scheme and then try to compile the program again. A simple display directory option would SAVE a lot of time.

A RAM-DISK program is also available from System Software. This allows you to treat an area of the C64's RAM as a disk drive giving you immediate acess to small files. It is possible to buy Oxford Basic together with this program, but we didn't have access to it for this review.

The package may seem a little pricey to some people but if you take a look at each of the programs that it provides, you can see that it is well worth it.

Touchline
System Software: 16B Worcester Place, Oxford OX1 2JW. Tel: 0865 54195.

MIDI and Your Micro

MIDI is a fascinating subject if you're vaguely musical. Here we bring you a comprehensive breakdown of currently available packages.

By Ian Waugh

Since the advent of MIDI, hardware and software packages have proliferated at the speed of bunnies. There are now so many music and MIDI packages on the market that it is difficult to know just what is available. Between me writing this and you reading it, new programs will have appeared and others updated. Some may have been removed from sale, new companies will have been formed and some companies may even have ceased trading. Yes, it's a busy life in the MIDI music software market.

Making a Choice

There are more music and MIDI packages for the Commodre 64 that ann the other computers put together so you couldn't have chosen a better computer for making music. Choosing a package is another matter. How do you decide? This guide is aimed at helping you narrow down the type of package you are interested in. Most companies will be pleased to send you their literature and some will be happy to answer any queries you may have by phone.

One important point to bear in mind is this: most manufacturers produce their own interface and their software usually won't work with a different one. This could severely limit your choice as, having bought an interface you could find yourself restricted to software packages from that one company. Some producers, however, are converting their programs to run with other interfaces. This can only be good for the customr – that's us – and is to be welcomed.

MIDI is not the be all and end all of computer control, however, and there are other stand-alone packages which you may like to consider such as Commodore's *Music Expansion System*. Perhaps something like that suits you better. Don't let technology bully you into buying a computer music system. Look into the subject, read about what it can do and then made your decision.

For those who have read and decided, there follows a brief run down of what you'll find in the market place.

MK5 MIDI

Famous for the Spectrum and Amdrum (why not Comdrun?), Cheetah has just released the *MK5 MIDI* controller keyboard which can be used with any MIDI Interface. It has five octaves of full-sized keys and you can select MIDI channel, shift the keyboard range over an octave and transmit a MIDI patch change number between one and 128.

C-Lab

Available from Sound Technology, *C-Lab*'s Super Track Sequencer's (£115) forte is real-time input although you can record in step-time,too. A single screen is used for all major operations but you can call up a MIDI Event Editor screen which lets you plod around in the depths of MIDI's innards. You don't have to get involved, though, and even without delving, the program is easy to use. Definitely one for your short list.

C-Lab produces a MIDI interface (£79) and a Sync interface (£106) although the software will work with a number of other interfaces including Steinberg's.

A scorewriting package called Score Track is in the offing.

Commodore Interface

Commodore produces the cheapest MIDI interface on the market – so far – at £19.95, designed for use with packages such as the *Music Studio, Music Expander* and *Sampler*. No separate so:tware is available yet.

Also, in conjuction with Music Sales, Commodore has several programs and add-ons at pocket-money prices. For example, a little clip-on keyboard overlay and album music to play. The *Music Expansion System* (£144.99) consists of a keyboard, some SID voice editing software and an *FM Sound Expander*. All items should be available separately. FM systhesis is really the bee's knees – as long as you don't have to program it – but the *Expander* restricts you to only a few presets.

The new packages are available to supplement the *Expander's* restricted facilities; an *Editor* to help program in music notation (both at £24.99). You should really budget for the *Editor* along with the *Expander* and if your're at home with music notation, get the *Composer*, too.

Electromusic

Electromusic Research Ltd is the world's most prolific producer of MIDI packages and has produced hardware and software for almost every popular home computer.

EMR's Commodore 64 interface is very reasonable (£79.90) a link box called *MIDLINK* (£34.95) with one MIDI IN and six MIDI THRU sockets is also available.

Software for the C64 includes the *Miditrack Performer* (£49.95), an eight-track, real-time polyphonic sequencer with features such as punch-in (no punch-out, though) track merging and transposition.

Their *Miditrack Composer* (£44.95) is a six-track step-time editor with a good range of editing facilities although you will find it difficult to enter odd note durations – as I sometimes wish to do during frenzied bouts of composition.

The *Miditrack Editor* (£39.95) gives you step-time editing control over the *Performer* tracks and will convert *Composer* tracks to real-time. This really takes you down among the bits and bytes.

Finally, *Vu-Music* (£24.95) converts MIDI info into visual patterns. It only does this in real-time, however, and cannot produce a display from a pre-recorded piece.

EMR software gives you a great deal of control over your music although it helps if you have some knowledge of MIDI. The packages are quite cheap for the facilities offered and are continually being updated. EMR also provide a MIDI INFOLINE (0702 335747) and the helpful people there are glad to assist with any MIDI series. They also ;run special package deals, too, so phone for details.

MIDI 1.1

The *MIDI 1.1* (£300) from Hinton, although not exclusively for the C64, provides an interface between MIDI equipment and a computer with an RS232 socket. Software has yet to appear but a utility program is aimed at encouraging you to write your own.

Jellinghaus

The Jellinghaus Commodore 64 interface (£90) was commissioned from SIEL (see SIEL) and has a MIDI IN, a MIDI THRU, three MIDI OUTs and an external Clock In.

The 12-track *Recording Studio* (£99.95) is a real-time package which holds velocity, after-touch, pitch-bend and patch-changfe information. It is quite easy to use but the manual could be better (unless it has been improved recently).

The *Sequence Chain Program* (£45) allows sequences to be linked to produce changes in time signature and tempo. Patch changes can also be stored.

The *Scorewriter* (£340) produces a hardcopy of your music, including lyrics. It contains three programs on EPROM: the 12-track *Recording Studio*, the *Sequence Chain Program* and the *Scorewriter* itself which seems, therefore, to cost around £195. Rather expensive, perhaps, but the EPROM means the programs are instantly available. The program works well but you may have to do a lot of setting-up to produce the results you want. The manual could be better but the printed notation is excellent.

The *SixTrack Sound Editor* (£50) is a voice editor for Sequential's SixTrack and MAX polysynths.

Joreth

The Joreth *Music Composer System* (£225) comprises their own AL25 interface and software (recently upgraded) which includes real- and step-time sequencing and editing.

Joreth's approach has been aimed at the musician rather than the computer buff. The 70-plus page manual contains all you need to know and, although it is quite a lot to wade through, a Quick Reference Guide helps so don't be put off. There are also several loose sheets of notes, information and corrections.

The program offers eight-track real- and step-time sequencing and uses a simple low-level MCL (Music Composition Language). Although it takes a significantly different approach to most software packages it is easy to use considering its complexity. It must be a strong contender for the best overall C64 MIDI package.

Other programs include a *Real-Time Part Loader* (£11.85) which allows the loading of real-time files part by part, from multiple files.

The Key Programmer (£11.85) accepts input in any key (or even no key) and allows key selection for printout at a later date.

For Casio CZ owners, the *Tone Editor* (£44.85) simplifies voice editing and permits voice storage on disk – a real boon.

Brand new is Joreth's *Linker System* (£94.90), an extension of the real-time system in their MCS. It allows you to link, loop and repeat up to 128 section of music with near-infinite precision.

Also new is the *System 7* (£79.99), for Yamaha's DX7 and TX7 synths. It's a rather superb voice editor and libration with lots of editing facilities, 320 free sounds and a sophisticated library organisation system which lets you build up and name your own blanks of 32 voices.

All Joreth's programs now run with other interfaces, too, although their AL25 has very impressive syncing facilities and is worth considering if this is your first interface.

Passport

The Passport Designs Commodore interface (£110) has a MIDI IN, MIDI OUT, drum sync In and Out with 24,48 or 98 ppqn (pulses per quarter note) to suit most drum machines. It has

become something of an industry standard – which means that other companies have copied it and are probably selling it cheaper.

Software for the Commodore includes *MIDI/4 Plus* (£80) and *MIDI/8 Plus* (£120), four- and eight-track real-time sequencing packages. The software is fairly easy to use, has good editing facilities and lets you merge tracks very easily.

Music Shop for MIDI (£80) is a step-time program. Notes are entered and shown in traditional notation and the program will produce a printout of your choice. It is very easy to use but much MIDI exotica is not supported, a fact which will not worry many users but bear it in mind. It works superbly with multi-timbral instruments such as Casio's CZ synths. A very good and easy introduction to MIDI and good value.

Also available is the *Midi Player* (£65) which stores up to eight songs/arrangements on a disk and produces a synchronised video display on the screen during playback.

Rainbird

Produced in association with System Software. *The Advanced Music System* from Rainbird (£39.95) is a SID-orientated music package – the best there is – which also includes some MIDI software. It is designed to work with the SIEL and Passport interface and is basically a six-track real-time sequencer. It doesn't compare with a dedicated MIDI package – and really isn't intended to – but it gives you the opportunity to experiment with MIDI. For example, it lets you convert music files to MIDI files and vice versa.

SIEL

SIEL recently sold out to Chase, a company which claims that it intends to continue to support SIEL keyboards and MIDI software. That being so, there follows a list of SIEL packages. Other music stores may still have stock, too. The prices are SIEL's and Chase may not adhere to them (they may even be reduced) but they are a guide.

The SIEL interface for the Commodore 64 (£79) is identical to JM'S.

The *Live Sequencer* (£69) for the C64 is an excellent 16-track real-time sequencer. It is easy to use and, although editing could be better, it's good value.

The *Multitrack Composer* (£39) is a six-channel step-time sequencer with lots of editing facilities but putting notes in can take time.

The *Expander Editor* (£53) helps enormously with editing on SIEL's Opea 6, DK600 and Expander 6 by showing parameters graphically on the screen. The *DK80 Editor* (£55) is for the DK80. Both programs have good graphics and editing facilities. A

MIDI Data Base (£39) can store 250 patches from any MIDI synth apart from Yamaha's DXs and Casio's CZs. That probably excldes more than half the synth owners in the UK but if you're one of the others it's a worthwhile program.

Steinberg Research

Steinberg's *Pro 16 Sequencer* (£100) is a 16-track real- and step-time sequencer with perhaps better real-time facilities than step-time. In operation it has taken its inspiration from a 16-track tape recorder. For example, you can edit a sequence by punching in and out. A very respectable, professional piece of software, competatively priced.

The *TNS (The Note System) Scorewriter* (£130) produces a printout of a *Pro 16* recording in traditional notation. It affords a degree of step-time entry and allows you edit the pieces which can then be played from the *Pro 16*.

An *Edit Kit* comprising a note editor and drum machine editor for the *Pro 16*is available for £30 and a combined *Pro 16* and *Edit Kit* is available on cartridge for £207.50 and a combined *Pro 16* and *TNS* is available for £285.00.

The *INT MIDI* interface will set you back £150.

The packages are very profesional, thorough and impressive. Definately worth serious consideration.

Track Star (£70) is an entry-level MIDI package containing its own MIDI interface. If MIDI puts the willies up you then *Track Star* is for you.

Cosmo (£77.50) is a voice editor and library system for Casio's CZ synths, a might on the expensive side although it contains 128 sounds on disk. *SES* (also at £77.50 does likewise for Yamaha's DX and TX synths) *MIR* (£120) is a visual editing system for the Mirage keyboard and expander.

Dr. T

Dr. T is an American software company, producing its own MIDI interface (£90) but the software will work with Passport's Sequential and possible other interfaces.

The *Keyboard Controlled Sequencer* (£125) combines real- and step-time in one. It has lots of features not found in other software such as Time Reverse which plays a sequence backwards and Auto Channel Assign which re-assigns consecutive events to different channels. Real-time is easy to use. Step-time has lots of options to let you program as many weird notes and time signatures as you wish. Certainly more products worth serious consideration.

Dr. T also produces Casio CZ (£65) and Yamaha DX (£75) Library Programs.

Touchline

Cheetah Marketing: *1 Willowbrook Science Park, Crickhowell Road, St Mellons, Cardiff.* ***Tel:*** *0222 7773377.*
Sound Technology: *6 Letchworth Business Centre, Avenue One, Letchworth, Herts SG 2HR.* ***Tel:*** *0462 675675.*
Commodore: *1 Hunters Road, Weldon, Corby, Northants NN17 1BR.* ***Tel:*** *0536 205555.*
EMR: *14 Mount CLose, Wickford, Essex SS11 8HG.* ***Tel:*** *0702 335747.*
Hinton Instruments: *168 Abingdon Road, Oxford, Oxon OX1 4RA.* ***Tel:*** *0865 721731.*
Jellinghaus: *from Rosetti, 138-140 Old Street, London ECIV 9BL.* ***Tel: 01 253 7294.***
Joreth: *PO Box 20, Evesham, Worcs WR11 5EG.* ***Tel:*** *0386 831 615.*
Passport Designs: *from Ritter Music Europe, 24 Bromgrove Gardens, Edgeware, Middx.* ***Tel:*** *01 952 5302.*
Rainbird: *First Floor 74 New Oxford Street, London WC1A 1PS.* ***Tel:*** *01 240 8838.*
SIEL: *from Chase, 22 Charlton Street, Off Euston Road, London NW1.* ***Tel:*** *01 387 7626.*
Dr T: *from Take Note Music Services, 112-126 Camden High Street, London NW1 ONB.* ***Tel:*** *01 267 6813.*

Mini Office II The Facts

Mini Office II from Database Software will turn your C64 into a complete home office at a ridiculously low price

By Gordon Hamlett

Pity the small businessman. There he is, trying to eke out an existence and everywhere he looks, he is faced with a plethora of advertisements imploring him to computerise. The idea makes a lot of sense but where does he start? What machine and, more importantly what software does he need?

There is also the small matter of cost. Hardware can cost anything from a few hundred pounds up to an infinite limit. Then you need to buy the big three — a word processor for your letters, a spreadsheet for managing your finances and a database to keep track of all your clients. The list goes on and on. Wouldn't it be nice if you could use the C64 that you've already got instead of splashing out on a new system.

Well, surprise surprise, you can. I wouldn't really be writing this article otherwise. The software packages mentioned above have been available for a long time but there has always been the nagging problem of compatibility — how easy is it to transfer information from your database to your word processor or whatever?

The Solution

Mini Office II is the name of the product which can do all this. Database Software has put together a fully compatible big three. Not only that, graphics, communications and label printing packages have been thrown in as well. Very useful, you may say. All I've got to do now is save enough pennies to buy this *Mini Office II*.

That shouldn't be too difficult either for, unbelievably, the package comes in at well under 20 pounds! And if that still proves to be too much, you can always enter our competition this month and try to win one!

The package comes on tape or disk but anyone wanting to use any sort of computerised system to run their business will soon discover that a tape based system soon becomes unmanageable. That is not to say that the tape package is useless. It is ideal for anyone who wants to learn about using business software.

In the Office

On loading *Mini Office II*, you are presented with a main menu allowing you to access any of the six programs. Selecting one of these loads the appropriate program and leads you into a further menu of choices. Any Commodore or Epson compatible printer is fully supported and most others should work perfectly. The only problem areas are likely to be in printing screen dumps from the graphics package.

Word Processing

The world processor is fairly comprehensive, containing the majority of commands that you are ever likely to use. These commands are entered via a combination of the control, logo and function keys. I found these to be strangely organised but this could just be that I am used to a totally different set of commands on my current wordpro. Files can be saved either as text or ASCII. This latter option is useful if you intend sending a document somewhere down a modem.

Before you print a document, you can alter various settings — headings, margins, page length etc. If you are likely to use the same settings time and time again, it will be worth your while setting up a file containing these commands that you can call up at will rather than have to enter everything separately all the time. Other facilities include a mail merge — useful when you are sending out a series of

standard letters and an automatic word count — ideal if you are writing magazine articles for demanding editors.

Computer Card Index

A database is no more than a collection of information. Where the computerised version scores over the traditional card box is the way that information can be accessed and manipulated.

The database consists of a series of records. Each separate record might correspond to e.g. a name and address of a customer or details of a record in your collection. Each record is further divided up into fields e.g. title of record, recording artist, recording company, date of release and price.

In *Mini Office II*, each record can consist of up to 20 fields and you can design the structure yourself. you can specify whether you want a field to contain alphanumeric characters (i.e. anything), decimal, integers, date or a formula. Designing the actual structure of a record is the hardest part and some considerable thought should be used. How many records you can have in a particular database depends on how big the record is. One disadvantage of the C64 is that the available memory soon gets used up although you can of course set up several similar bases if you find that you have too many records.

Where databases become particularly useful is when you want to access the information. Records can be sorted on any field or a combination of them and it is easy to extract bits of information rather than complete records. A typical example would be a club secretary writing to his members to remind them that their annual subscriptions are now due. Not everyone will have joined at the same time so you instruct the computer to pull out only those records that apply. you can then use the mail merge facility in the wordpro to send them a personalised renewal form.

If planning a database is hard, then doing the same for a spread sheet is doubly so. Yet for anyone running a small business, the results are definitely worthwhile.

Calculations

A spreadsheet is no more than a large piece of paper, divided up into rows and columns, with each individual area called a cell. You put figures into these cells and the computer juggles them about for you. Sound complicated? It's not really that bad.

Suppose that you were using the spreadsheet to keep a note of your company's money — bills to be paid and invoices received. You could set things up as follows:- Across the top of the sheet, you could have a column for each month of the year and down the side, details of your previous expenses and profits. Data can then be entered accordingly.

So far, this does not seem to offer much of an advantage over the paper and pencil method. The first advance comes from the fact that a particular cell can also be a formula rather than just an item of data. Thus you could have a row marked total expenses and let the program work out the sum of the previous rows for you. OK, so it saves you a bit of time but it's still not exactly mindblowing. But what if the Chancellor suddenly decides to alter the rate of VAT. It will take you ages to recalculate everything by hand. But it is simple using a spreadsheet and you can have the new figures in a matter of minutes.

Then you can start making 'what if' calculations. What if I cut the price of my products but sell 10% more etc.? The spreadsheet allows you to examine the various possibilities so that you can maximise your profit.

Picture This

Unless your name is Isaac Newton or similar, given a page full of figures — e.g. a spreadsheet — most people look blank. It doesn't matter that you have everything neatly labelled or whatever, very few people can extract any sort of meaningful data quickly when it is presented like that.

Roll on the graphics package. Information can be saved from the spreadsheet for representing graphically. Typically, this will be the totals produced by the spreadsheet e.g. monthly profit, but information can be entered directly.

There are three forms of display available to you — a bar chart, a line graph and a pie chart. These can all be labelled and you can use different types of shading to delineate the various sections. Presentation of data is becoming increasingly important. If you can show your bank manager a graph of your projected profits, he may be more willing to sift through the raw data than if you just gave him a spreadsheet and told him to draw his own conclusions.

Extras

The other two features of *Mini Office II* are a communications package and a label printer. The comms package can be used either via a serial modem/RS232C or Compunet. The protocols have been established for Microlink/Telecom Gold but you can establish your own protocols if you want to hook up somewhere else. somewhere else.

The label printer lets you design your own layout and size. Information can then be pulled from your database ready for printing.

Verdict

Who would use *Mini Office II?* It is ideal for anyone who is running a club and wants to maintain records of its members. If you are running a business, again the package is excellent but... think long and hard about plans for your expansion. If your business is likely to remain at its current level then fine, but if you intend branching out, you may be advised to invest in a more powerful micro. Not because *Mini Office* is no good, but because of the limitations of the C64.

The package itself is superb value for money and has got to be one of the bargains of the year.

Touchline
Title: *Mini Office II.* ***Supplier:*** *Database Software, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.* ***Tel:*** *061 456 8835.* ***Price:*** *£16.95 (cass) £19.95 (disk).* YC

Hex Data Entry II

An updated version of our machine code entry program.

By M.C. Stretton assisted by P.A. Eves

The *Your Commodore* Hex Data Entry program has been written with you, the reader in mind. No longer will it be a painstaking ordeal, typing in all the long list of data. This program will ensure a 100% correct entry, each and every time you use it.

It has become apparent that a number of people are experiencing problems using an earlier version of this program. The program presented here is an update of this version and cures any problems that we are aware of.

For your own safety, do not use the first version of Hex Data Entry.

On first entering the Hex Data Entry, only the LOAD DATA and DATA ENTRY options are available to you. This is because the buffer is empty, and the other two options require data to be present. On selecting the LOAD DATA option, you are asked for TAPE or DISK. Press either 'T' or 'D' then RETURN. The program remembers the last Input/Output, and so it is possible to just hit RETURN if the correct device type is being displayed. You are then required to enter a filename.

If you should make an error in your filename entry, you may either delete single characters by the DEL key, or SHIFT/CLRHOME will delete the whole filename. After the prompt, hit return and the file will be loaded into the buffer. The program will allow files up to 95 blocks in length to be loaded in. If you want larger programs to be entered, you will have to split them into two or more parts first.

The SAVE option is identical to the LOAD, except that it takes the contents of the buffer and saves them out to the given start address. This will save an executable file, that can be loaded and run, independent of the Input program.

Data Entry

The Data Entry option is the option by which you can enter data from *Your Commodore*, or your own creations. Once this option is selected you are asked if you want to continue from the given address. If you have just 'LOADed' a file, this address will be the next available byte in the buffer. (Allowing you to add more data to the end of the loaded file). Therefore if you wish to continue typing in at the last address, type 'Y'. If 'N' is pressed the program assumes you are starting a fresh entry. When this happens the buffer is reset to zero, thus losing any program currently in memory. (I have chosen $C000 as the normal start up address purely because most M/C progs reside here). After pressing 'N', you are then asked for the starting address, in Hex. Any valid Hex number is acceptable, e.g. $400, $C00, $C0400. In this example, the first figure, $400, would be interpreted as $0400 by the program. Likewise $286 is taken to be $0286.

Once the start address is given, you are asked if you want checksums or not. If you are typing in a program from *Your Commodore* your response will be 'Y'.

The screen display now changes to show the current address being poked into. Type any valid Hex number and the program automatically skips the next byte without the need to type commas, spaces or returns. If you make a mistake, one press of the DEL key will erase the whole number. If in the no checksum mode, when you get to the end of the line, the line will automatically scroll up ready for your next input.

If in checksum mode, after eight bytes are entered you must type the two digit checksum at the end of the line. Unlike the no checksum mode you now press return to enter the line.

If the program finds that the checksum does not match the line entered, a warning tone will be sound. You will then be asked if you wish to either: a) Re-enter the line or b) Re-enter the checksum.

After checking your line, if you find you have entered it wrongly, then press 'L'. The line will be erased and you then re-enter it correctly. If you find that you have only made a mistake in typing in the checksum, then press 'C' and re-enter it. Should you wish to stop entering data, simply press return

or space bar on a blank line to get you back to the main menu. Here you may SAVE your program so as to restart another day, or you may wish to see a printout.

On choosing the print option, you have a choice of hard copy or screen copy. The listing can be paused at any time by pressing down and holding down any key. Pressing the RUN/STOP key and holding it down will break out of the print mode and return you to the main menu.

The left arrow key 'top left of the keyboard', acts as zero when typing in your data. The space bar acts as the return key when entering data, thus leaving you free from searching for the return key.

I hope that this program will help to take the drudgery out of typing in long lists of data statements. YC

PROGRAM: HEX DATA ENTRY II

```
83  1 POKE788,52:CLR:BU=16384
A9  2 DV=8:CB=16384:POKE650,128:
    POKE53280,12:POKE53281,12:PO
    KE646,1:PRINT"[CLR,REV H,REV
     SN]"
AD  3 LN=0:CA$="$C000":CA=49152:
    SA=CA
BC  4 GOSUB212
74  5 PRINT"[CLR]";
CD  6 PRINT"[HOME,RVSOFF,BLACK,C
    @40]";
D4  7 PRINT"[RVSON,BLACK] YOUR C
    OMMODORE HEX INPUTTER - (C)
    1986 ";
F3  8 PRINT"[RVSON] -DESIGNED AN
    D WRITTEN BY M C STRETTON- [
    RVSOFF]";
86  9 PRINT"[WHITE,DOWN6,RIGHT13
    ][F1] LOADS DATA"
45  10 PRINT"[DOWN2,RIGHT13][F3]
     SAVES DATA"
36  11 PRINT"[DOWN2,RIGHT13][F5]
     ENTER DATA"
AE  12 PRINT"[DOWN2,RIGHT13][F7]
     PRINT DATA"
B8  13 GOSUB125
81  14 ONFKGOSUB164,176,16,84
BC  15 GOTO6
2E  16 GOSUB197
C3  17 PRINT"[HOME,DOWN,BLACK,RV
    SON]CONTINUE FROM[SPC27,UP,R
    IGHT14]";CA$
9E  18 POKE198,0:WAIT198,1:GETA$
D4  19 IFA$="N"THENCB=16384:GOTO
    22
F4  20 IFA$="Y"THENPRINT"[WHITE]
    ";:GOTO24
F5  21 GOTO18
72  22 PRINT"[HOME,DOWN,BLACK,RV
    SON]DATA ADDRESS: $....[SPC2
    0,UP,RIGHT15]";
26  23 GOSUB132:PRINT"[WHITE,RVS
    OFF]";:HH$=IN$:GOSUB120:SA=D
    E:CA=DE:CA$=HH$:LN=0
15  24 PRINT"[HOME,DOWN,BLACK,RV
    SON,SPC4]DO YOU WISH TO ENTE
    R CHECKSUMS?[SPC5,RVSOFF]";
C7  25 POKE198,0:WAIT198,1:GETA$
81  26 IFA$="N"THENCF=1:GOTO29
EE  27 IFA$="Y"THENCF=0:GOTO29
F2  28 GOTO25
53  29 PRINT"[CLR,WHITE]";
26  30 SYS59626
F9  31 GOSUB61
89  32 IN$=""
24  33 GOSUB125
DD  34 L=LEN(IN$)
B4  35 IFA$=CHR$(20)THENGOSUB57:
    GOTO33
D1  36 IFA$=CHR$(13)ANDRE=0THENP
    RINT"[CLR]":RETURN
C9  37 IFA$=CHR$(32)ANDBE=0THENP
    RINT"[CLR]":RETURN
46  38 IFA$="←"THENA$="0":GOTO42
A5  39 Y=0:IFASC(A$)>47ANDASC(A$
    )<58THENY=1
1B  40 IFASC(A$)>64ANDASC(A$)<71
    THENY=1
22  41 IFY=0THEN33
6D  42 PRINTA$;:DN=DN+1:IFDN=2TH
    ENPRINT" ";:GOTO44
A9  43 IN$=IN$+A$:GOTO33
79  44 IN$=IN$+A$
26  45 HH$=IN$:GOSUB120
D1  46 POKE CB,DE:CA=CA+1:CB=CB+
    1:DN=0:BE=BE+1:IN$=""
7B  47 IFBE=8ANDCF=1THENGOTO30
39  48 IFBE=8ANDCF=0THENPRINT"[R
    IGHT3]";:GOSUB71:GOSUB65
FF  49 IFBE=8ANDCC$=UC$THENGOTO3
    0
25  50 IFBE=8ANDCC$<>UC$THENGOSU
    B202:GOTO52
DE  51 GOTO33
6A  52 LN=LN-1:ONEFGOTO56,53
36  53 PRINT"[HOME,WHITE,DOWN24,
    RIGHT37]";
29  54 PRINT"..[LEFT5]";
CA  55 GOTO48
DB  56 CB=CB-8:CA=CA-8:GOTO31
41  57 IFBE=0THENGOSUB59:RETURN
10  58 IFDN=0THENPRINT"[LEFT3]..
    [LEFT2]";:BE=BE-1:CB=CB-1:CA
    =CA-1:IN$="":RETURN
B6  59 IFL=>1THENIN$=LEFT$(IN$,L
    -1):PRINT"[LEFT].[LEFT]";:DN
    =DN-1
B2  60 RETURN
F3  61 DE=CA:GOSUB113:CA$=LEFT$(
    "$0000",5-LEN(HH$))+HH$
FB  62 PRINT"[HOME,DOWN24,RIGHT,
    WHITE]";CA$;"[SPC4].. .. ..
    .. .. .. .. ..";
B8  63 IFCF=0THENPRINT"  : ..";
A1  64 PRINT"[HOME,DOWN24,RIGHT1
    0]";:BE=0:DN=0:IN$="":RETURN
88  65 CH=0:CC$=""
D8  66 IFCA=SATHENRETURN
64  67 FORX=1TO8:CH=CH+(X*(PEEK(
    (CB-9)+X))):NEXT
95  68 CH=CH+(LN*8)
F0  69 DE=CH:GOSUB113:CC$=MID$(H
    H$,3):LN=LN+1
C8  70 RETURN
22  71 POKE198,0:UC$=""
C6  72 GETL$:IFL$=""THEN72
DF  73 L=LEN(UC$):IFL$=CHR$(20)A
    NDL>0THEN75
CC  74 GOTO76
46  75 UC$=LEFT$(UC$,L-1):PRINT"
    [LEFT].[LEFT]";:GOTO72
6F  76 IFL$=CHR$(13)ANDL=2THENCK
    =VAL(UC$):RETURN
D2  77 IFL$=" "ANDL=2THENCK=VAL(
    UC$):RETURN
0B  78 IFL$="←"THENL$="0"
97  79 Y=0:IFASC(L$)>47ANDASC(L$
    )<58THENY=1
2D  80 IFASC(L$)>64ANDASC(L$)<71
    THENY=1
FF  81 IFY=0ORL=2THEN72
6E  82 PRINTL$;
67  83 UC$=UC$+L$:GOTO72
AE  84 IFCA=SATHENRETURN
CC  85 LN=0:GOSUB197:PRINT"[HOME
    ,DOWN,RVSON,BLACK,SPC3]PRINT
     TO SCREEN [S] OR PRINTER [P
    ][SPC3]"
F5  86 PRINT"[UP2,RVSON,SPC3]BEW
    ARE: ENTIRE BUFFER GETS PRIN
    TED[SPC3]"
A2  87 PRINT"[UP,RVSON,SPC3]ANY
    OTHER KEY RETURNS TO MAIN ME
    NU[SPC3]"
84  88 POKE198,0:WAIT198,1
67  89 GETK$
BC  90 IFK$=""THEN89
69  91 IFK$="S"THENNU=3:GOTO96
A6  92 IFK$="P"THENNU=4:GOTO94
00  93 PRINT"[WHITE,CLR]":RETURN
74  94 PRINT"[HOME,DOWN,BLACK,RV
    SON]  SWITCH ON PRINTER THEN
     PRESS RETURN[SPC3]"
DD  95 POKE198,0:WAIT198,1:GETA$
    :IFA$<>CHR$(13)THEN94
1E  96 OPEN3,NU:PRINT#3
F3  97 PS=16384:PE=16384+(CA-SA)
    :PC=PS:AS=SA:IFPE=PSTHEN112
B0  98 PRINT"[CLR]"
29  99 IFPEEK(203)<>64THEN99
35  100 DE=AS:GOSUB113:CA$=LEFT$
    ("0000",4-LEN(HH$))+HH$
D6  101 CK=0:PRINT#3,"[SPC4]";CA
    $;
30  102 FORX=0TO7:Q=FRE(0)
8E  103 DE=PEEK(PC+X):GOSUB113:B
    $=RIGHT$(HH$,2)
4D  104 PRINT#3," ";B$;:NEXTX
64  105 GOSUB198
B1  106 PRINT#3," :"+CC$
D5  107 PC=PC+8:AS=AS+8
D6  108 IFPC<PETHENGOTO99
07  109 IFNU=3THENPOKE198,0:WAIT
    198,1
97  110 PRINT"[CLR]";
2D  111 DE=AS:GOSUB113:CA$=LEFT$
    ("$0000",5-LEN(HH$))+HH$
DE  112 POKE198,0:PRINT#3:CLOSE3
    :PRINT"[CLR]":RETURN
F9  113 A=INT(DE/256):B=DE-A*256
    :C=INT(A/16):D=A-16*C
21  114 C$=CHR$(48+C):IFC>9THENC
    $=CHR$(C+55)
E3  115 D$=CHR$(48+D):IFD>9THEND
    $=CHR$(D+55)
46  116 E=INT(B/16):F=B-16*E
9E  117 E$=CHR$(48+E):IFE>9THENE
    $=CHR$(E+55)
18  118 F$=CHR$(48+F):IFF>9THENF
    $=CHR$(F+55)
86  119 HH$=C$+D$+E$+F$:RETURN
```

```
B7  120 IFLEN(HH$)<4THENHH$=LEFT$("0000"+HH$,4-LEN(HH$))+HH$
30  121 A=ASC(HH$)-48:B=ASC(MID$(HH$,2,1))-48
88  122 C=ASC(MID$(HH$,3,1))-48:D=ASC(MID$(HH$,4,1))-48
08  123 DE=256*(16*(A+7*(A>9))+B+7*(B>9))+16*(C+7*(C>9))+D+7*(D>9)
F2  124 RETURN
04  125 FK=0:Q=FRE(0)
A2  126 POKE198,0:WAIT198,1:GETA$
DD  127 IFA$=CHR$(133)THENFK=1
2E  128 IFA$=CHR$(134)THENFK=2
3B  129 IFA$=CHR$(135)THENFK=3
3C  130 IFA$=CHR$(136)THENFK=4
0D  131 RETURN
F5  132 IN$=""
B5  133 GETL$:IFL$=""THEN133
5D  134 L=LEN(IN$):IFL$=CHR$(20)ANDL>0THEN136
43  135 GOTO137
85  136 IN$=LEFT$(IN$,L-1):PRINT"[LEFT].[LEFT]";:GOTO133
71  137 IFL$=CHR$(13)ANDL>0THENRETURN
85  138 IFL$=CHR$(32)ANDL>0THENRETURN
F3  139 FLAG=0:IFASC(L$)>47ANDASC(L$)<58THENFLAG=1
CC  140 IFASC(L$)>64ANDASC(L$)<71THENFLAG=1
7A  141 IFFLAG<>1THENGOTO133
08  142 IFL=4THENGOTO133
81  143 PRINTL$;
1E  144 IN$=IN$+L$:GOTO133
F9  145 FORX=1TO16:POKE832+X,32:NEXT
39  146 PRINT"[HOME,DOWN,RVSON,BLACK]FILENAME: [[SPC16]][SPC12,UP,RIGHT11]";
B7  147 FL$=""
56  148 GETA$:IFA$=""THEN148
CF  149 L=LEN(FL$)
24  150 IFA$=CHR$(20)ANDL>0THEN153
BD  151 IFA$="[CLR]"THEN145
AC  152 GOTO155
08  153 FL$=LEFT$(FL$,L-1):PRINT"[LEFT] [LEFT]";
A8  154 GOTO148
56  155 IFA$=CHR$(13)ANDL>0THEN161
72  156 IFA$=CHR$(32)THEN158
88  157 IFASC(A$)<32ORASC(A$)>90THEN148
54  158 IF L=16THEN148
9E  159 PRINTA$;
1D  160 FL$=FL$+A$:GOTO148
64  161 FORX=1TOLEN(FL$):POKE832+X,ASC(MID$(FL$,X,1)):NEXT
09  162 POKE183,L
2D  163 RETURN
9D  164 GOSUB197:GOSUB188:GOSUB145
BC  165 IFDV=1THENPRINT"[HOME,DOWN,BLACK,RVSON]  PLACE TAPE IN DECK THEN PRESS 'PLAY' [CS]":GOTO171
55  166 PRINT"[HOME,DOWN,BLACK,RVSON] PLACE DISK INTO DRIVE THEN HIT RETURN  [CS]"
36  167 POKE198,0:WAIT198,1:GETA$:IFA$<>CHR$(13)THEN167
4D  168 PRINT"[HOME,DOWN,BLACK,RVSON]LOADING[SPC33]"
10  169 PRINT"[RVSON,UP3,RIGHT8]";FL$
90  170 SYS49244:GOTO172
E6  171 SYS49152
59  172 A=PEEK(829):B=PEEK(830):C=PEEK(831):D=PEEK(832)
76  173 SA=(256*B)+A:CA=(256*D)+C:SZ=CA-SA:CB=BU+SZ:LN=INT(SZ/8)
A4  174 DE=CA:GOSUB113:CA$=LEFT$("$0000",5-LEN(HH$))+HH$
21  175 RETURN
D2  176 IFCA=SATHENRETURN
86  177 GOSUB197:GOSUB188:GOSUB145
B8  178 A=SA-INT(SA/256)*256:B=INT(SA/256):POKE829,A:POKE830,B
B0  179 C=CA-INT(CA/256)*256:D=INT(CA/256):POKE831,C:POKE832,D
B2  180 IFDV=1THENPRINT"[HOME,DOWN,BLACK,RVSON]PLACE TAPE IN DECK THEN PRESS 'REC-PLAY'[CS]":SYS49203
CD  181 IFDV=1THENSYS49206:RETURN
05  182 PRINT"[HOME,DOWN,BLACK,RVSON] PLACE DISK INTO DRIVE THEN HIT RETURN  [CS]"
D4  183 POKE198,0:WAIT198,1:GETA$:IFA$<>CHR$(13)THEN183
87  184 PRINT"[HOME,DOWN,BLACK,RVSON]SAVING[SPC34]"
73  185 PRINT"[RVSON,UP3,RIGHT7]";FL$
D3  186 SYS49343
35  187 RETURN
32  188 PRINT"[HOME,DOWN,BLACK,RVSON]TAPE OR DISK:[SPC27]";
52  189 IFDV=1THENPRINT"[HOME,DOWN,RIGHT14]TAPE[SPC22]";
45  190 IFDV=8THENPRINT"[HOME,DOWN,RIGHT14]DISK[SPC22]";
5D  191 POKE198,0:WAIT198,1:GETA$
44  192 IFA$="T"ANDDV=8THENPRINT"[HOME,DOWN,RIGHT14,RVSON]TAPE":DV=1
C0  193 IFA$="D"ANDDV=1THENPRINT"[HOME,DOWN,RIGHT14,RVSON]DISK":DV=8
31  194 IFA$=CHR$(13)THENRETURN
3D  195 IFA$=CHR$(32)THENRETURN
78  196 GOTO191
6A  197 PRINT"[HOME,DOWN2,SPC40]";:RETURN
CE  198 CH=0:A=KB-8:FORX=1TO8
5E  199 CH=CH+(X*(PEEK((PC-1)+X))):NEXT
F1  200 CH=CH+(LN*8)
B8  201 DE=CH:GOSUB113:CC$=MID$(HH$,3):LN=LN+1:RETURN
DD  202 PRINT"[HOME,BLACK,RVSOFF,C@40]";
52  203 PRINT"[RVSON]INPUT ERROR - RE-ENTER [WHITE]L[BLACK]INE OR [WHITE]C[BLACK]HECKSUM";
57  204 PRINT"[RVSOFF,CT40]"
79  205 GOSUB252
77  206 GETA$:IFA$=""THEN206
2C  207 IFA$="L"THENEF=1
1B  208 IFA$="C"THENEF=2
11  209 IFA$<>"C"ANDA$<>"L"THEN206
B6  210 PRINT"[HOME]";:FORX=1TO3:PRINT"[SPC40]";:NEXT
5D  211 RETURN
88  212 I=49152
ED  213 PRINT"[CLR,DOWN10,RIGHT7]PLEASE WAIT ONE MOMENT...."
2C  214 PRINT"[HOME,DOWN11,RIGHT7,CT26]"
FD  215 READX:IFX=256THENRETURN
B4  216 POKE I,X:I=I+1:GOTO 215
61  217 DATA 32,44,247,173,60,3,133,255
BE  218 DATA 169,0,133,193,169,64,133,194
FE  219 DATA 56,173,63,3,237,61,3,170
47  220 DATA 173,64,3,237,62,3,168,24
28  221 DATA 138,101,193,133,174,152,101,194
1A  222 DATA 133,175,32,162,245,165,255,141
2E  223 DATA 60,3,96.32,183,247,169,0
CC  224 DATA 133,193,169,64,133,194,56,173
83  225 DATA 63,3,237,61,3,170,173,64
5C  226 DATA 3,237,62,3,168,24,138,101
5E  227 DATA 193,133,174,152,101,194,133,175
3A  228 DATA 32,124,246,96,169,96,133,185
5C  229 DATA 169,1,141,60,3,133,184,169
36  230 DATA 8,133,186,169,0,133,195,133
1C  231 DATA 147,169;65,133,187,169,3,133
4B  232 DATA 188,169,64,133,196,164,183,32
5E  233 DATA 175,245,32,213,243,165,186,32
F5  234 DATA 9,237,165,185,32,199,237,32
BD  235 DATA 19,238,141,61,3,32,19,238
9A  236 DATA 141,62,3,32,232,244,165,174
A4  237 DATA 141,63,3,56,165,175,233,64
33  238 DATA 141,64,3,24,173,61,3,109
92  239 DATA 63,3,141,63,3,173,62,3
C0  240 DATA 109,64,3,141,64,3,96,169
70  241 DATA 97,133,185,169,1,133,184,169
B5  242 DATA 8,133,186,169,65,133,187,169
ED  243 DATA 3,133,188,165,185,164,183,32
CD  244 DATA 213,243,32,143,246,165,186,32
46  245 DATA 12,237,165,185,32,185,237,169
FD  246 DATA 0,133,172,169,64,133,173,56
A4  247 DATA 173,63,3,237,61,3,133,174
22  248 DATA 173,64,3,237,62,3,133,175
4C  249 DATA 24,169,64,101,175,133,175,173,61,3
46  250 DATA 32,221,237,173,62,3,160,0
2D  251 DATA 32,33,246,96,256
7A  252 POKE 54296,15:POKE 54277,0:POKE 54278,200
88  253 POKE 54273,40:POKE 54272,00:POKE 54276,17
91  254 FOR X=1 TO 300:NEXT:POKE 54276,0:POKE 54277,0:POKE 54278,0:RETURN
```

List Enhancer

This program will improve the LIST facility on your C64, almost beyond recognition.

By A.J. Barker

Page-Lister is a utility/program aid that supplements the List function on the Commodore 64.

The normal List command is adequate if you are working on a small program. With larger programs it has some drawbacks; you need to either remember line numbers or LIST all of the program up to the section on which you are currently using the CTRL key and RUN/STOP to stop the display.

This procedure is, to say the least, clumsy and inefficient – especially since it is frequently repeated during program development.

One answer to the problem would be a scrolling program lister which allows you to list both forwards and backwards through the program to the appropriate point. This is most definitely an improvement, but it would still require a line number to be typed in each time if you are not working near the start of the program.

COMMAND	PARAMETER	DEFAULT (if blank)	DESCRIPTION
+	Number (n)	Current Page size.	Shift display forward n lines.
–	Number (n)	Current page size.	Shift display backwards n lines.
B	None	N/A	List last page of program.
C	None	N/A	List current page.
L	Line number	0	List 1 page from line number
P	Number (n)	21	Set current page size to n.
I	None	N/A	List first page of program.

An Alternative

The Page-Lister utility presented here is an alternative to scrolling and it is, I believe, more practical. Instead of scrolling, Page-Lister allows the program being developed to be listed as selected screens of 'pages'; stopping after each complete page. It then allows you to continue to page forwards or backwards through the program, editing as required. The size of the page is initially set to 21 lines. This may be altered, however, so that you could, if you wanted, display the program a line at a time, stopping after each line.

Other functions allow you to list the first or last page of the program or to shift the display forwards or backwards a specified number of lines relative to the current line number at the top of the page. You may also list a page starting from a specified line number or re-display the current page. The current page location is always remembered by Page-Lister. This means that you can work on a particular page, run the program, and then re-display the page you were working on without having to remember line numbers – a most useful development aid.

Loading and Activating

Type in the Basic loader and save to tape or disk, as usual, before running to install the machine code. Type SYS49152 RETURN to activate Page-Lister – this will cause the message "PAGE-LISTER ACTIVE" to be displayed to inform you of its current state. You will also notice that, when active, Page-Lister sets character colour to black. If SYS49152 is entered again then Page-Lister is de-activated, causing the message "PAGE-LISTER INACTIVE" to be displayed and setting character colour to blue. Now load a Basic program – preferably a large one – and activate Page-Lister before trying out the commands.

Page-Lister Commands

Page-Lister commands consist of one letter followed by an optional number, where applicable, and must be entered on a blank line (i.e. extraneous data is not allowed). The current + or – command is forced into the cursor position immediately after the READY prompt after a page has been displayed. Thus scanning forwards or backwards through the program

requires only RETURN. If you set the repeat key on (POKE 650, 128) then you can page through a large program very rapidly by simply holding down the return key.

Keeping Track

The + command, if entered with no parameter, will move the display on a number of lines equal to one less than the current page size. This means that the bottom line of the current page is retained as the top line of the next page. The opposite is true of the – command. The idea of this is to help you keep track of where you are in the program while paging.

Page-Lister is located at 49152-50042 ($SC000-SC37A) if you wish to save it as a machine code object program. It is not re-locatable and cannot be used to list a loaded directory but it works with MIKRO assembler and so far has been compatible with the Commodore C64 DOS wedge. YC

```
AB  100 REM**********************************
28  110 REM*      PAGE-LISTER    0.20       *
1F  120 REM*      A.J.B. 22/10/86           *
0D  130 REM**********************************
2D  1000 FOR I = 49152TO 50042
0E  1010 READ IP%
D1  1020 POKE I,IP%
88  1030 NEXT
94  1040 END
E9  1050 DATA 76,157,192,18,144,42,42,42,42
FD  1060 DATA 42,42,42,42,42,42,32,80,65
8E  1070 DATA 71,69,45,76,73,83,84,69,82
74  1080 DATA 32,65,67,84,73,86,69,32,42
03  1090 DATA 42,42,42,42,42,42,42,42,42
21  1100 DATA 146,141,18,154,42,42,42,42,42
E2  1110 DATA 42,42,42,42,32,80,65,71,69
62  1120 DATA 45,76,73,83,84,69,82,32,73
D8  1130 DATA 78,65,67,84,73,86,69,32,32
B8  1140 DATA 42,42,42,42,42,42,42,42,146
15  1150 DATA 141,0,0,0,0,0,0,0,0
22  1160 DATA 0,20,0,0,0,43,157,144,141
E9  1170 DATA 0,0,0,141,0,0,0,0,0
E5  1180 DATA 0,0,0,0,0,67,84,66,76
C4  1190 DATA 170,171,80,0,0,0,0,255,255
B1  1200 DATA 0,0,20,0,20,0,20,0,192
6D  1210 DATA 194,65,194,65,194,65,194,83,194
3C  1220 DATA 119,194,22,194,120,173,101,192,208
B1  1230 DATA 31,169,3,133,251,169,192,133,252
8C  1240 DATA 32,106,195,173,8,3,141,114,192
26  1250 DATA 173,9,3,141,115,192,169,228,160
B6  1260 DATA 192,162,255,208,19,169,47,133,251
6D  1270 DATA 169,192,133,252,32,106,195,173,114
1E  1280 DATA 192,172,115,192,162,0,234,142,101
B3  1290 DATA 192,141,8,3,140,9,3,88,96
81  1300 DATA 76,7,193,234,142,121,192,166,58
A9  1310 DATA 232,208,38,165,122,141,116,192,165
C5  1320 DATA 123,141,117,192,32,115,0,240,11
91  1330 DATA 162,6,234,221,122,192,240,21,202
13  1340 DATA 16,247,234,173,117,192,133,123,173
FD  1350 DATA 116,192,133,122,24,174,121,192,108
21  1360 DATA 114,192,234,234,142,99,192,32,115
F8  1370 DATA 0,144,22,208,188,138,10,168,185
5B  1380 DATA 129,192,141,102,192,200,185,129,192
6F  1390 DATA 141,103,192,234,76,83,193,234,224
46  1400 DATA 2,176,2,144,161,24,32,107,169
06  1410 DATA 32,121,0,208,152,165,20,141,102
C8  1420 DATA 192,165,21,141,103,192,234,169,147
63  1430 DATA 32,210,255,169,255,170,32,200,194
5B  1440 DATA 208,16,205,100,192,176,11,165,43
A8  1450 DATA 133,95,165,44,133,96,76,195,166
74  1460 DATA 234,141,108,192,142,109,192,173,99
25  1470 DATA 192,32,169,194,141,95,192,142,96
33  1480 DATA 192;162,0,234,189,104,192,205,111
48  1490 DATA 192,240,6,157,119,2,232,208,241
B0  1500 DATA 169,3,133,198,173,109,192,141,94
E6  1510 DATA 192,56,173,108,192,237,100,192,141
74  1520 DATA 93,192,176,3,206,94,192,234,173
FC  1530 DATA 94,192,205,96,192.144,11,208,22
BC  1540 DATA 234,173,93,192,205,95,192,176,13
27  1550 DATA 234,173,93,192,141,95,192,173,94
12  1560 DATA 192,141,96,192,234,173,95,192,174
04  1570 DATA 96,192,32,38,195,141,91,192,142
F5  1580 DATA 92,192,165,95,141,97,192,165,96
70  1590 DATA 141,98,192,234,24,173,95,192,109
38  1600 DATA 100,192,141,95,192,144,3,238,96
81  1610 DATA 192,234,173,95,192,174,96,192,32
3F  1620 DATA 38,195,133,20,134,21,234,173,97
19  1630 DATA 192,133,95,173,98,192,133,96,234
BE  1640 DATA 76,201,166,234,173,103,192,208,31
DF  1650 DATA 173,102,192,240,26,201,23,240,22
D6  1660 DATA 56,233,1,234,141,100,192,141,137
CD  1670 DATA 192,141,139,192,208,7,238,137,192
74  1680 DATA 238,139,192,234,234,24,32,192,194
EC  1690 DATA 96,234,173,102,192,141,91,192,173
FC  1700 DATA 103,192,141,92,192,32,192,194,234
F8  1710 DATA 96,234,32,192,194,169,43,141,104
53  1720 DATA 192,24,173,93,192,109,102,192,141
2B  1730 DATA 93,192,173,94,192,109,103,192,141
29  1740 DATA 94,192,173,93,192,174,94,192,234
A2  1750 DATA 96,234,32,192,194,169,45,141,104
AC  1760 DATA 192,56,173,93,192,237,102,192,141
30  1770 DATA 93,192,173,94,192,176,12,237,103
F5  1780 DATA 192,234,176,6,234,169,0,141,93
68  1790 DATA 192,234,141,94,192,173,93,192,174
EF  1800 DATA 94,192,234,96,234,96,201,7,176
CF  1810 DATA 17,10,168,185,143,192,141,119,192
FC  1820 DATA 185,144,192,141,120,192,108,119,192
CF  1830 DATA 56,96,234,173,91,192,174,92,192
7F  1840 DATA 234,133,20,134,21,169,0,141,93
74  1850 DATA 192,141,94,192,165,43,166,44,133
85  1860 DATA 57,134,58,234,160,1,133,95,134
88  1870 DATA 96,177,95,240,54,165,95,133,57
64  1880 DATA 134,58,160,3,165,21,209,95,144
E8  1890 DATA 40,240,3,136,208,9,165,20,136
8E  1900 DATA 209,95,144,28,240,18,136,177,95
49  1910 DATA 170,136,177,95,238,93,192,208,3
C0  1920 DATA 238,94,192,76,220,194,165,95,133
FE  1930 DATA 57,165,96,133,58,173,93,192,174
BE  1940 DATA 94,192,24,234,96,234,141,93,192
B0  1950 DATA 142,94,192,165,43,166,44,160,1
0E  1960 DATA 133,95,134,96,177,95,240,31,173
95  1970 DATA 93,192,13,94,192,240,28,56,173
C8  1980 DATA 93,192,233,1,141,93,192,176,3
2F  1990 DATA 206,94,192,177,95,170,136,177,95
9E  2000 DATA 76,49,195,169,255,170,208,9,24
6B  2010 DATA 160,3,177,95,170,136,177,95,234
D7  2020 DATA 96,160,0,177,251,205,111,192,240
B2  2030 DATA 6,32,210,255,200,208,243,96,40
```

Software for sale

If you think that one of our programs looks very interesting, but you can't afford the time to type it in then our software service will help you out.

It's three o'clock in the morning. You sit at the computer keyboard just finished a marathon typing session entering one of the superb programs from *Your Commodore*. Your fingers reach for the keyboard and press the letters R, U and N. You press RETURN, sit back and nothing happens.

Everyone has probably faced this problem. When it does happen it's a matter of spending hours searching through the program for any typing mistakes. No matter how lo ng you look or how many people help you, you can usually guarantee that at least one little bug slips through unnoticed.

The *Your Commodore* Software Service makes available all of the programs from each issue on both cassette and disk at a price of £6.00 for disk and £4.00 for cassette. None of the documentation for the programs is supplied with the software since it is all available in the relevant magazine. Should you not have the magazine then back issues are available from the following address:

INFONET LTD, Times House, 179 The Marlowes, Hemel Hempstead, Herts. HP1 1BB.
TEL: (0442) 48435

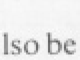
please contact this address for prices and availability.

The Disk

Programs on the disk will also be supplied as totally working versions, i.e. when possible we will not use Basic Loaders thus making use of the programs much easier. Unfortunately at the moment we cannot duplicate C16 and Plus/4 cassettes. However programs for these machines will be available on the disk.

What programs are available?

At the top of each article you will find a strap containing the article type, C64 Program etc. So that you can see which programs are available on which format you will also find a couple of symbols after this strap. The symbols have the following meaning:



This symbol means that the program is available on cassette.



These programs are available on disk.

Please Note

Since the programs supplied on cassette are total working versions of the program, we do not put disk only programs on tape. There is no sense in placing a program that expects to be reading from disk on to tape. YC

JANUARY 1987

SELECT MENU 128 — Add a menu program to your C128 disk collection.
DISK ARCHIVE — Now you can make a total backup of all your disks on to cassette for safe keeping. A complete disk uses five minutes of tape (C64).
TAPE HEADER — Find out where your cassette based programs start in memory. For the C16 (Jan Disk only).
ANIMATOR — Generate your own animated character sequences with this program for the C64.
DUMPER — Produce copies of your Plus/4 text and Hi-res screens with this handy screen dump program (Jan disk only).

ORDER CODE
DISK YDJAN87 £6.00
TAPE YCJAN87 £4.00

FEBRUARY 1987

TURBO MENU MAKER — Add menus and high speed loading to your disks (C64 — disk only).
HEX DATA ENTRY — Your Commodore program entry system.
X-RAY FILE — Get more information from your disk drive (C64 disk).
ADVENTURE AID GRAPHICS — Easy graphics for our Adventure Creator system.
LABELLER 64 — Easy addressing with this label printer for the C64.
WORD PRO ADD ON — Add descenders to your MPS 801 printouts with the Plus/4 word processor.
NURSERY RHYME LAND — An educational adventure for the young ones.

ORDER CODE
DISK YDFEB87 £6.00
TAPE YCFEB87 £4.00

MARCH 1987

SPELLING CHECKER — for use with the Plus/4 word processor — disk only.
NINE LINE MATRIX — Clearer 80 column displays on your C128.
JOYSTICK READ — Invaluable joystick routine for Basic programmers with a C64.
LABELLER 64 — See February 1987.
HEX DATA ENTRY — Our machine code easy entry program for C64.
WIMPS AND MUCH MORE — An extension to our C64 Wimps program plus a foolproof INPUT system.
DISKIT — Memory Saver, Program Compressor and One Part Maker. The first three parts of this popular series for C64 and disk (Disk only).
NURSERY RHYME LAND — See February 1987.
POPPER — A game featuring Popper the green pea, for the C64.

Order codes
DISK YDMAR 87 £6.00
TAPE YCMAR 87 £4.00

APRIL 1987

Cribbage – A computerised version of this popular card game. Plus/4, disk only.
Diskit 4 – A protection program to look after your C64 programs (disk only).
Diskit 5 – A machine code to DATA statement convertor for C64 (disk only).
C128 Keypad Modifier – Make your numeric keypad more useful when entering data.
Letter Writer – A novel way to send musical letters to your friends (C64).
Double Print – The bigger the better. Give your C64 double height characters.

ORDER CODE
DISK YDAPR87 £6.00
TAPE YCAPR87 £4.00

MAY 1987

Lower Case Graphics – using lower case text on your C16 and Plus/4 graphics screen. (On disk only).
C16 Character Editor – A powerful character editor for the C16 and Plus/4. (On disk only).
Everyman's Guide to Graphics – All of the programs from this fascinating article.
C64 Sprite Editor – A comprehensive sprite editor for the C64. Available for both disk and tape.
Cedit 64 – A character editor with no fewer than 44 different commands. (Available for tape and disk).

ORDER CODE
DISK YDMAY87 £6.00 TAPE YCMAY87 £4.00

Cassettes or disks are available back to March 1986. Please ring the Editorial office (01-437-0626) for details of these.

ORDER FORM – PLEASE COMPLETE IN BLOCK CAPITALS

NAME	QTY	TAPE/DISK	ORDER CODE	PRICE
JUNE '87		TAPE (£4.00)	YC JUNE 87	
JUNE '87		DISK (£6.00)	YD JUNE 87	
OVERSEAS POST £1				
			TOTAL	

NAME. . . . .

ADDRESS. . . . .

POSTCODE. . . . .

I enclose a cheque/postal order for £. . . . . . made payable to ARGUS SPECIALIST PUBLICATIONS LTD.

All orders should be sent to: YOUR COMMODORE, READERS SERVICES, ARGUS SPECIALIST PUBLICATIONS, 9 HALL ROAD, HEMEL HEMPSTEAD, HERTS HP2 7BH.
Please allow 28 days for delivery.

Bare Facts

In order to translate a screen display from one machine to another an intimate knowledge of the machine's video controller is required. We give comparisons of the video on the popular Commodore machines.

Every computer program will use the video display at some time or another. Writing a program that looks professional requires an intimate knowledge of the various functions of the computer's video controller.

This article will provide you with memory maps for the video controller of all the popular Commodore home computers.

It is beyond the scope of this article to explain exactly how how individual memory location is used. We have dealt with graphics in many articles in the past.

POKEing Around

Quite often we are asked the question, what does this POKE do or why is that POKE used? If you refer to the memory maps printed here for the video chips, and the earlier memory maps printed in the February 1987 issue you should be able to find out what most of the different POKEs perform. For example, the best way to attract anyone's attention to your display is to alter the colour of the screen display. This is extremely easy to do on all of the Commodore computers but must be approached in a different way depending on the actual computer that is being used.

To change any colour on the C64 you are required to access the video controller directly with POKE instructions. If you have a look at the memory map for this chip you will see that the screen colour is stored in memory location 53281 and the border colour is stored in memory location 53280. Pokeing a number between zero and 15 into either of the above locations will change the relevant item to the specified colour. For example:

POKE 53280,0:POKE53281,0

will change both border and screen to black.

When trying to convert programs to or from a C64 to any of the other Commodore computers altering the colours can become confusing. This is because the C16, Plus/4 and C128 all have Basic commands that allow you to change the colours without referring to POKEs. The syntax for the colour commands are shown in Figure 1.

FIGURE 1

C-16 COMMAND

COLOR SOURCE, COLOUR, LUMINENCE

SOURCE

0 = BACKGROUND
1 = FOREGROUND
2 = MULTICOLOUR 1
3 = MULTICOLOUR 2
4 = BORDER

Since all the above commands do is to alter the registers in the machines video chips, as you would yourself on the C64, it is possible to access the various registers yourself. If you refer to the details for the C128 and C16/Plus/4 you will see that the colour of the border is stored in memory locations: 53280 and 65305 respectively. Should you enter the following commands:

POKE 53280,0 on the C128 or
POKE 65305,0 on the C16 and Plus/4.

you will find that the border colour will change to black, just as though you had entered the relevant COLOR command.

Don't be afraid of POKEing around in memory to see what effects can be achieved, the worst that you can do is crash your Computer so that you have to reset it. YC

VDC - C128 80 column controller

This chip has 36 internal regiesters that cannot be accessed through normal POKE commands. To manipulate any register within this chip you must:

A) If you wish to write to the chip:
Write the register number in address $D600.
Write the new value in $D601.
B) If you wish to read a register:
Write the register number in $D600.
$D601 now contains the value in that register.

Reg No	Bit	Description
0		Horizontal Total - ie the total number of characters per line
1		Horizontal Displayed - The number of actual characters per line
2		Horizontal Sync - position of left hand border
3		Sync Width
	7-4	Vertical sync pulse width
	3-0	Horizontal sync pulse width in characters
4		Vertical Total - number of lines

Reg	Bits	Description
5		Vertical total adjust
	4-0	Fine adjustment for No 4.
6		Vertical Displayed - Number of representable characters
7		Top border position
8		Interlace
	1-0	00 & 10 non-interlace mode
		01 interlace sync mode
		11 interlace sync and video mode
9	4-0	Number of raster lines per character
10	6-5	00 - steady cursor
		01 - cursor off
		10 - fast blinking cursor
		11 - slow blinking cursor
11	4-0	Line at which cursor will stop
12		Start address of video RAM - high
13		Start address of video - low
14		Cursor position high byte
15		Cursor position low byte
16		Light pen vertical position
17		Light pen horizontal position
18		UPDATE ADDRESS - the high byte of any address to be manipulated by the VDC
19		UPDATE ADDRESS - low byte of above
20		Attribute memory high byte
21		Attribute memory low byte
22		Character width
	7-4	Total number of displayed horizontal lines
	3-0	Number of displayed lines
23		Character height
		No of vertical lines displayed
24	6	Reverse screen
	4-0	Scroll screen vertically
25	7	0=Text mode enabled
		1=Single dot graphics enabled
	6	1=Colour comes from attribute RAM
		0=In monochrome
	5	1=Space between two characters is filled with colour of last character
		0=Space is filled with background colour
	4	1=Characters appear in double width
	3-0	Horizontal smooth scrolling
26	7-4	Foreground colour
	3-0	Background colour
27		If character width is increased this should contain the number of bytes that need to be added to each character row in the video RAM
28	7-5	Address of character generator
	4	RAM type
29	4-0	Character line in position an underline should take place. Usually 8
30		Number of characters to be written to the update address. If COPY set then this contains the number of characters to be written into the update address
31		Holds the data to be written to a memory location. If a memory location is read then the contents will appear here.
32		Start address of block to be copied - high byte
33		Low byte of above
34		Display enable begin
35		Display enable end
36	3-0	Rate at which the VDC memory must be refreshed.

VIC chip - Graphics on C128 & C64

Hex	Bits	Description
D000		Sprite 0 X position bits 0-8
D001		Sprite 0 Y position bits 0-8
D002		Sprite 1 X position bits 0-8
D003		Sprite 1 Y position.
D004		Sprite 2 X Position
D005		Sprite 2 Y position
D006		Sprite 3 X position
D007		Sprite 3 Y position
D008		Sprite 4 X position
D009		Sprite 4 Y position
D00A		Sprite 5 X position
D00B		Sprite 5 Y position
D00C		Sprite 6 X position
D00D		Sprite 6 Y position
D00E		Sprite 7 X position
D00F		Sprite 7 Y position
D010		9th bit of sprite X co-ordinate
	0	Sprite 0
	1	Sprite 1
	2	Sprite 2 etc.
D011		VIC control register
	7	Raster compare register bit 9
	6	1=Enable extended colour text mode
	5	1=Enable bit-map mode
	4	1=Blank screen to border colour
	3	1=25 row text display, 0=24 row text display
	2-0	Smooth scroll to Y dot position
D012		Raster compare register - position of raster on screen
D013		Light pen X position
D014		Light pen Y position
D015		Enables or disables sprites
	0	1=Enable sprite 0
	1	1=Enable sprite 1
	2	1=Enable sprite 2 etc
D016		VIC control register
	4	1=Multi-colour mode on
	3	1=40 column text
		0=39 column text
	2-0	Smooth scroll to X position.
D017		Sprite vertical expansion
	0	Expand sprite 0 vertically
	1	Expand sprite 1 vertically
	2	Expand sprite 2 vertically etc.
D018		Vic memory control
	7-4	Video matrix base address
	3-0	Character set base address
D019		VIC interrupt flags
	7	Set on any VIC IRQ condition
	3	Light pen triggered bit 7
	2	Sprite vs Sprite triggered bit 7
	1	Sprite vs Background triggered bit 7
	0	Raster compare triggered bit 7
D01A		VIC interrupt switches
	3	1=Enable light pen interrupts
	2	1=Sprite vs sprite enabled
	1	1=Sprite vs background enabled
	0	1=Raster compare enabled
D01B		Sprite priority registers
	0	1=Sprite 0 passes in front of graphics
	1	1=Sprite 1 passes in front of graphics etc
D01C		Sprite multi colour select
	0	1=Sprite 0 is multi-colour
	1	1=Sprite 1 is multi-colour etc
D01D		Sprite horizontal expansion
	0	1=Expand sprite 0 horizontally
	1	1=Expand sprite 1 horizontally etc.
D01E		Sprite vs Sprite collision detection. If a sprite is touching a sprite the bit for that sprite is turned on.
D01F		Sprite Vs Background. If sprite has hit text or background relevent register is set.
D020		Border colour (dec = 53280)
D021		Background colour (dec = 53281)
D022		Multi-colour 1
D023		Multi-colour 2
D024		Multi-colour 3
D025		Sprite multi-colour 0
D026		Sprite multi-colour 1
D027		Sprite 0 colour
D028		Sprite 1 colour
D029		Sprite 2 colour
D02A		Sprite 3 colour
D02B		Sprite 4 colour
D02C		Sprite 5 colour
D02D		Sprite 6 colour
D02E		Sprite 7 colour
D030		C128 ONLY 2MHz
	0	Determines if the C128 operates at 2MHz or 1MHz. If the bit is set then there is no access to the VIC chip and the C128 operates in 2MHz mode. Your Commodore July 1986 demonstrated how this could be used to speed up a C128 in C64 mode

SID - Sound on the C128 and C64

Hex	Bit	Description
D400		Voice 1: low byte of frequency
D401		Voice 1: high byte of frequency
D402		Voice 1: Low byte of pulse width
D403	3-0	Voice 1: high byte of pulse width
D404		Voice 1: Control Register
	7	1=Random noise on
	6	1=Pulse waveform on
	5	1=Sawtooth waveform on
	4	1=Triangle waveform on
	3	1=Disable voice 1
	2	1=Ring modulate voice 1 with voice 3
	1	1=Synchronize voice 1 with the frequency of voice 3
	0	1=Start attack, decay, sustain
		0=start release
D405		Voice 1: attack / decay
	7-4	Attack cycle duration
	3-0	Delay cycle duration
D406		Voice 1: sustain / release
	7-4	Sustain cycle duration
	3-0	Release cycle duration
D407		Voice 2: low byte of frequency
D408		Voice 2: high byte of frequency
D409		Voice 2: Low byte of pulse width
D40A	3-0	Voice 2: high byte of pulse width
D40B		Voice 2: Control Register
	7	1=Random noise on
	6	1=pulse waveform on
	5	1=Sawtooth waveform on
	4	1=Triangle waveform on
	3	1=Disable oscillator 1
	2	1=Ring modulate oscillator 2 with oscillator 1
	1	1=Synchronize oscillator 2 with oscillator 1 frequency
	0	1=Start attack, decay, sustain
		0=Start release
D40C		Voice 2: attack / delay
	7-4	Attack cycle duration
	3-0	Delay cycle duration
D40D		Voice 2: sustain / release

Hex	Bit	Description
	7-4	Sustain cycle duration
	3-0	Release cycle duration
D40E		Voice 3: low byte of frequency
D40F		Voice 3: high byte of frequency
D410		Voice 3: Low byte of pulse width
D411	3-0	Voice 3: high byte of pulse width
D412		Voice 3: Control Register
	7	1-Random noise on
	6	1-Pulse waveform on
	5	1-Sawtooth waveform on
	4	1-Triangle waveform on
	3	1-Disable voice 1
	2	1-Ring modulate oscillator 3 with oscillator 2 output
	1	1-Synchronize oscillator 3 with the frequency of oscillator 2
	0	1-Start attack, decay, sustain 0-start release
D413		Voice 3: attack / delay
	7-4	Attack cycle duration
	3-0	Delay cycle duration
D414		Voice 3: sustain / release
	7-4	Sustain cycle duration
	3-0	Release cycle duration
D415	2-0	Filter cutoff - low nybble
D416		Filter cutoff - high byte
D417		Filter control
	7-4	Filter resonance
	3	1-External input to filter
	2	1-Voice 3 to filter
	1	1-Voice 2 to filter
	0	1-Voice 1 to filter
D418		Filter volume and mode
	7	1-Turn off voice 3 output
	6	1-High pass filter on
	5	1-Band pass filter on
	4	1-Low pass filter on
	3-0	Output volume
D419		A/D convertor for paddle 1
D41A		A/D convertor for paddle 2
D41B		Produces random number when voice 3 set to noise
D41C		Output of voice 3 envelope generator

Ted chip details for Plus/4 and C16.

Hex	Bit	Description
FF00		Timer 1 low.
FF01		Timer 1 high
FF02		Timer 2 low
FF03		Timer 2 high
FF04		Timer 3 low
FF05		Timer 4 high
FF06	6	1-Extended background mode on
	5	1-Bitmap mode on
	4	Screen off
	3	25 or 24 lines on screen (0=24)
	2-0	Vertical smooth scroll position
FF07	7	RVS-Video
	6	PAL/NTSC mode (0=PAL)
	5	Freeze mode (1=on)
	4	Multicolour mode (1=on)
	3	40 or 38 columns (0=38)
	2-0	Horizontal smooth scroll position
FF08		Keyboard matrix
FF09		Interrupt control
	5	Timer 3 interrupt
	4	Timer 2 interrupt
	3	Timer 1 interrupt
	1	Raster compare has occured
FF0A		Interrupt enable
	5	1-Enable timer 3
	4	1-Enable timer 2
	3	1-Enable timer 1
	1	1-Enable raster compare
	0	Bit 8 of raster comparison
FF0B		Raster comparison bits 0-7
FF0C	7-2	Not used
	1-0	Bits 8-9 of cursor position
FF0D		Bits 0-7 of cursor position
FF0E		Frequency of voice 1 (bits 0-7)
FF0F		Frequency of voice 2 (bits 0-7)
FF10	1-0	Frequency of voice 2 (bits 8-9)
FF11	7	Disable sound
	6	1-Noise on voice 2
	5	1-Rectangular on voice 2
	4	1-Voice 1 enable
	3-0	Volume - 0=off, 15=loud
FF12	5-3	Bitmap address bits 13-15
	2	1-Characters from ROM 0-Characters from RAM
	1-0	Voice 1 frequency bits 8-9
FF13	7-3	Address of character set
	2	1-Lower case
FF14	7-3	Address of colour memory
FF15	6-4	Luminance of background 0
	3-0	Colour of background 0
FF16	6-4	Luminance of background 1
	3-0	Colour of background 1
FF17	6-4	Luminance of background 2
	3-0	Colour of background 2
FF18	6-4	Luminance of background 3
	3-0	Colour of background 3
FF19	6-4	Luminance of border
	3-0	Colour of border
FF1A	1-0	Bits 8-9 of bit map reload
FF1B		Bit map reload of character position bits 0-7
FF1C	0	Bit 8 of raster row
FF1D		Current raster row bits 0-7
FF1E		Current raster column bits 1-8
FF3E		ROM select when written to
FF3F		ROM out when written to

C64 Teletext

Most people imagine that Teletext is merely a sports results and weather forecast service. With the C64 adaptor from Microtext, it can be much more.

By Mike Roberts

Teletext on computers such as the BBC has been common for some time. But only now can the humble Commodore owner access the cheapest general purpose database around.

Background

Many years ago before home computers were the reality that they are now, it was still obvious that there would be a need for a public computer service. The original videotext concept was designed with the paged system of showing information on individual pages with subsidiary frames for extra information. From the start it was to be a colour system and people would be charged for using the information.

The video standard chosen was now the familiar 40 x 24 Teletext graphics system. At about the same time however, meetings were going on to create a unified teletext system based around similar ideas except that the screen would be format based around a 32 column format. In a mad fit of standardization, both these groups met and adopted the videotext system. The name Videotext was then adopted to cover both services.

In Use

The format of teletext is dramatically simple and is one of the best system analysis jobs that I have ever seen. A remote keypad is used to key in a three digit number from an initial menu. The first menu leads to subsidiary menus or to the information required. The page can also be accessed directly if the number is known or by looking on the index. Once a page has been selected it can flick through a number of frames.

The transmission time aspect is important. Depending on the service, between two and five frames are transmitted per second. So when you type in your page request you have to wait a few seconds for it to appear. So you acess the page number, read the screen and, every 30 seconds, the page will change to the next frame as they cycle around. If you want the page to stay longer then you can 'hold' the page so that it will not be updated until you want it to. Alternatively, you can ask for an update which will put the normal TV picture back on to the screen until a new frame has been received when it will automatically be put up on to the screen.

The Commodore Connection

BBC micros (as usual) had the first crack at Teletext with the incredibly expensive Acorn Teletext adaptor. However, this was the first case that, if the Acorn software failed to work, the user could just download the patch to fix it from the TV. This downloading is potentially the most interesting thing about Teletext — think of each screen as 1K of information, then think of a data rate of one Megabyte per second.

When Channel 4 started to use a system very similar, they couldn't use the BBC system. So a Spectrum Teletext adaptor was commissioned and Teletext programs transmitted for it.

Somewhere though, in the dash to bring out Teletext adaptors for the cheapest and most expensive computers on the market, one of the best — the Commodore 64 — was left out. Microtext has sought to remedy the situation.

Nowadays the page acquisition circuits are all self contained in mass produced chips. The main problem is interfacing them and building the extremely good tuner that a teletext pickup requires — ever seen a portable with a loop ariel with teletext? The graphics picture is also another problem — but not with modern home computers.

C64 Adaptor

The Microtext Teletext adaptor gets around the greatest problem, that of a tuner, by using a video recorder. No, you don't get one in the package, but you do get six foot of cable. The cable connects to the normally unused video out socket to the video recorder. This connection puts out a good composite video signal of whatever the video is tuned to. This can also be connected to a Commodore monitor.

Most video recorders have either a phono or BNC connector on them. The supplied cable has a phone connector on the business end and a BNC adaptor. So there should be little connection difficulty. However, having an all singing, all dancing, stereo/RGB/digitally tuned/state of the art etc. television, my direct video connection was already being used and I had to disconnect the TV from the video via this route and use the normal RF connection to get the video to talk to the TV again.

However, if you know enough about TV/video hook ups to get a direct video connection going then you should appreciate and understand the problem. If you look behind your TV and can only count two wires (power and aerial) going to it then you're alright. If you've got five or so (like mine) and don't know why then get help. Microtext say that they are bringing out a separate tuner in the near future that will alleviate all these problems.

All this said and done it is easy to connect the box to the wire, the wire to the video, and the box to the Commidore 64. From here you load the tape into the computer and away you go.

The adaptor has most of the functions of a normal TV adaptor and one or two more that it is sensible to have. To change channel you use the channel selector switch on the video, pages are selected by just typing the number in. Standard functions included are Reveal — that puts on the screen information that is usually hidden, such as the answers to a quiz — and Hold, freezing a page until it is read.

Usual functions such as Expand, which zooms in one the top or bottom of the screen, Update, which was described earlier, and mix are not present — though there are good reasons for it. Expand is to let you read the display easier at distance, TVs are usually watched from across a room. A computer monitor is not usually set up in this way. However, if it was being used in a Teletext application a normal TV would be used, in which case normal Teletext rules apply.

Update and Mix are not present becuase you can't mix a normal TV signal in with the Commodore 64's output so there is no need for them. The final missing command is TCP, or time control program. This is where you can program your Teletext adaptor to put up a page on the screen at a specified time. This is again normally used to remind you of something when watching a normal programme on TV. Though I wish it could have been included.

There are a lot of extra commands though. You can call up the next or last page, of limited use but nice anyway. Save and Load will perform those functions to disk or tape and would be expected in a package of this type as memory saves are awkward on a Commodore as it is. The last extra command is the best of all, allowing you to pring a page on to paper.

The Package

The Software is more in the form of an operating system than of a program. There are two parts to it. The first is a Basic program that provides all the above functions, and the second is a collection of machine code routines that actually do all the hard work like accessing the screens.

Both programs are unprotected and the Basic portion is documented by REMs telling you what parts do what, making it easily customised. Both programs are easy to save to disk or tape. The machine code section even has a routine to save itself.

The manual is a marvel of documentation, afte a quick overview of the system that explains a bit about Teletext and the way it is used, the software is fully explained. Teletext is largely self documenting and has help pages on it.

As well as explaining all the system calls to access the machine code, three example programs are included that expand the system slightly, for instance accessing and printing out the TV times for the evening. There is also a patch on to the main program that provides a screen dump on to a daisy wheel printer.

Applications

Once you've got the hang of Teletext, and that's not difficult, you can do what you like. The adaptor can be programmed to do almost anything. Just think, a database with most of the information that you would never need to access on Prestel, plus some more that's constantly updated. No line charges, no page charges, no modem with indifferent software that ties up a phone line for hours.

Applications that Microtext knows of in use include, reading the football results directly into a pools predictor program to keep it updated, and a program that analyses weather trends by reading the weather map.

I know of someone with a BBC micro that wakes itself up, prints out the news and TV information, then wakes up his owner ready for his just printed newspaper to read on the train — and remember the news is only minutes old, not up to 18 hours like a normal hot lead and newsprint.

Conclusion

I've been using Teletext for nearly four years now. As a result I don't buy newspapers and I don't buy any of the TV listings magazines. The few pounds extra on the price of a TV set is easily worth having the extra facilities.

When I first started using the Microtext adaptor I thought that all there was to Teletext was what I'd already been using, how wrong I was. With computer control, and a computer contolled tuner and eight Teletext channels to read off, I can use Teletext as no-one ever intended. The adaptor is good and produces less errors than my normal Teletext set and the software is excellent and easy to use.

The initial price looks daunting when compared to the price of a Teletext TV set, but think what the price of a Modem, good software, and line charges would be after a few months. This then becomes a lot cheaper.

Teletext has become my main source of information, if I need any, my handset bleeps purposefully. Now with computer control the sky's the limit. I wouldn't hesitate to recommend this to anyone.

Touchline

***Microtext:** 7 Birdlip Place, Horndean, Hants, PO8 9PW. **Tel:** 0705 595794.*

Cedit

We provide cassette modifications for our character editor.

By Brian Rhodes

Cedit 64 is proving an extremely popular program amongst our readers. Unfortunately we aren't able to bring you more detailed instructions as promised in this issue, however the changes required for cassette users are presented here widening the appeal of this superior character editor.

The Changes

All of the changes required are extremely simple. Even if you are a disk user then it is probably worthwhile making the changes to your program since it allows you to select between tape and disk at will. You never know when you might need to SAVE something out to cassette.

The major change to the program is the CHAR ED LOAD routine. This program has been altered quite a lot. The new version of the program has been printed here.

The CHAR ED M/C LOAD program needs a very minor change to its very last line, 1040, this should be changed to:

1040 SAVE "CHAR CODE", 1

A number of lines need to be added to the CHAR BAS program, and several modifications are also made to some existing lines.

All of the necessary changes and additions are presented here and should cause no problems.

REMEMBER when using cassette the programs should be SAVEd in the following order:

1) CHAR ED LOADER
2) CHAR CODE — created when you RUN the CHAR ED M/C LOAD program.
3) CHAR BASIC

It is important that you give the programs the correct names or the program will not work.

PROGRAM: CHAR ED LOAD

```
EC   10 REM CHARACTER EDITOR LOAD
     ER
1F   20 Q$=CHR$(34):DEV=PEEK(186)
8E   30 POKE53281,6:POKE53280,14
56   40 PRINT"[CLR,BLUE]POKE43,1:
     POKE44,65:POKE16640,0:NEW"
23   50 PRINT"[DOWN2]L[SO]"Q$"CHA
     R CODE"Q$","DEV",1"
2C   55 IF DEV=1THEN PRINT
FB   60 PRINT"[DOWN4]NEW"
E5   70 PRINT"[DOWN2]L[SO]"Q$"CHA
     R BASIC"Q$","DEV
60   75 IF DEV=1THEN PRINT
69   80 PRINT"[DOWN4]RUN:[SPC3,WH
     ITE]LOADING : CHARACTER EDIT
     OR"
55   90 PRINT"[DOWN2,SPC12]WRITTE
     N BY BRI[BLUE]"
AF   100 POKE198,6
08   105 IFDEV=1THENPOKE198,8
5A   110 POKE631,19:FORK=632TO639
     :POKEK,13:NEXT
F8   120 END
```

CHANGES TO CHAR BASIC

```
8E   405 PRINT"[SPC7,RED]F2[BLUE,SPC5
     ]TAPE"
DD   416 IFQ$="[F1]"THENPOKE49197,8:P
     OKE49469,8:DEV=8:GOTO442
B5   417 IFQ$="[F2]"THENPOKE49197,1:P
     OKE49469,1:DEV=1:GOTO442
OF   442 IFDEV=8THENOPEN2,8,15
CO   444 PRINT"[CLR,SPC16]STORAGE"
D7   446 PRINT"[SPC16,CT7]"
5F   455 IFDEV=1THENGOTO468
82   500 IFDEV=8THENGET#2,C$:PRINTC$;
     :IFC$<>CHR$(13)THEN500
```

Analyser

Machine code programs are difficult to write, however debugging them can be even more of a problem. This program for your 128 provides some useful facilities to make this task easier.

By R. Assenheim

The problem with machine code programs is that once designed and coded, they never work. If you have designed a particularly long piece of work, then it is a long and complicated job trying to debug the program.

This program is designed to aid programmers in debugging their m/c programs.

Loading and Running

Once you have typed in the loader, the Basic program will save a copy of the program on disk under the name 'ANALYSER'.

Once this is done you can either run it in BANK 0 or 1. First load the ANALYSER either from the MONITOR or from Basic using the BLOAD command. The program MUST be loaded at address EA00, so for example if you want to load the ANALYSER in BANK 1 from the monitor then type:

L "ANALYSER",8,1EA00 or L "ANALYSER",8

for loading into BANK 0. If you don't have a disk then you will have to save the ANALYSER yourself using the MONITOR, with the command:

S "ANALYSER",1,1EA00,1FEB0

after running the loader. (Don't forget to delete the BSAVE command in the loader.)

Load the program in as above, but just replace the 8 with a 1.

As the program can either run in BANK 0 or 1 this gives plenty of scope for other programs to run.

Once Loaded

The way this program works, is to allow the programmer to place 'breakpoints' in a machine code program. When the processor, as it is stepping through a machine code program, reaches one of these breakpoints, an interrupt occurs and control is then returned back to the ANALYSER. This allows the programmer to use the functions available either in the Analyser or the monitor, to see if the program is doing what it should. These breakpoints don't affect how the program runs, and it is possible to restart execution from one of these and the 8502 will continue as though nothing has happened.

The advantage of this is not only to see what is happening at that point in the code, but you are also allowed to change the situation so as to test the program response to different circumstances. This is invaluable when designing a bug-free program.

Another useful feature of this program is that when you are debugging a machine code program, and something does go wrong, then pressing RUN/STOP will exit this program and return you back to the Analyser command line, however, there is a danger when using this with the TRACE facility, but this is described later.

The commodore key can be used to slow output to the screen, but DO NOT use the NO SCROLL key as this will cause the whole system to lock.

Two further features included are a USER INTERFACE and the ability to define how information is output.

The USER INTERFACE is a relatively simple one. You enter a command and supply parametric data with this command.

There are two ways of supplying the parametric data. Either you can let the Analyser prompt you for the required information, or you can skip all the prompting, and just supply all parametric data straight after the command word, and then press enter.

Just press enter on a prompt to terminate the interaction between you and the system and the system ignores all previous input for the command.

The ability to define information output is very useful. Since a machine can access the screen directly, you may be designing a screen of some kind within the program. You don't want the Analyser just displaying information anywhere, and messing up the screen, and perhaps covering a point on the screen you particularly want to see.

The next section describes the available examples on how to use them.

BP

This is used to set a breakpoint at an address either in Bank 0 or Bank 1. When program execution hits the address specified, it returns control back to the Analyser, listing any information required.

The parametric data required is:

ADDRESS of breakpoint (only possible in BANK 0 or BANK 1).
TURNING ON or OFF a breakpoint.
If TURNING ON then - LIST MEMORY or REGISTERS (if required).

Example 1
BP

ADDRESS ... 02000
ON/OFF ... ON
LIST/NOLIST (N/L) ... L
TYPE (A/R) ... A
ADDRESS ... 00100
LENGTH ... 30
MODE (H/D/C) ... D

Note
Typing N will stop further prompts. A=address, R=register, H=hex, D=dec, C=char.

Example 1 sets a breakpoint at address 2000 in BANK 0. When the 8502 gets to this address in this bank, you are returned to the command line of the Analyser and the first 30 bytes from address 0100 in bank 0 are displayed in decimal.

The address is given in five bytes, the first byte being the BANK and the next four bytes being the ADDRESS. Please note that the BANK can ONLY be 0 or 1. If you specify a different bank then the system will decide whether it is part of BANK 0 or 1 and then use that RAM BANK.

If no BANK is given, then BANK 0 is the default.

The BANKS are defined the same way as the bank command available in Basic.

As you get more experienced with this program, the above example could be entered on one line:

BP 02000 ON L A 00100 30 D

You can only have 11 breakpoints set at any one time.

For the more curious, the way breakpoint works, is to place a hex '00' (i.e. a BRK command) at the address specified. When the PC reaches this address it generates an interrupt. This interrupt is detected, and so the breakpoint routines are run.

If you disassemble an address where you have placed a breakpoint, it will be different as the the Analyser changes the code at that point by placing 00 at the address. OFF will replace the code. You MUST place a breakpoint on a COMMAND boundary for it to work.

COLOUR

This allows the user to change the colour of the border, background, colour of cursor, and colour of output text. The system will prompt for required parameters.

Example 2
COLOUR 9 0 4 7

This sets border colour to brown, background colour to black, cursor colour to yellow and character colour to purple.

The colour definitions are in the same order as in Basic, but the starting value is 0 not 1.

The program won't let you define the cursor colour (input ink) to be the same as the background colour (paper). This stops you from setting up a situation where you can't see what you are typing in. If you forget the order, just type 'COLOUR' and the Analyser will prompt you for the required information.

DELAY

This slows down execution of the program being debugged when using the TRACE facility: 1 = fastest and 255 & 0 = slowest.

Example 3
DELAY 50
or
DELAY AMOUNT (0...255) ...50

END

This ends the Analyser, removing all breakpoints and IRQ vector changes. You are then returned to the MONITOR.

Example 4
END

GO

This command is used to restart execution from the last breakpoint encountered which has been set up by the Analyser.

The program will start as though no stop has been encountered. This is useful if you want to change the conditions at a certain point. You would do this by setting a breakpoint at an address, and when it stopped, you could change memory or registers using the monitor (see later on how to enter the monitor).

Example 5
GO

HELP

This lists all commands available to the user.

Example 6
HELP (or just press the HELP key)

IRQ

The trace facility requires the use of the IRQ vector for it to work. This means that the vector is redirected. If the program you are trying to debug also requires the use of the IRQ vector, then the TRACE facility is lost. However, if you stop your program from changing the vector, and then use this command to route the IRQ vector to the address of your interrupt routine, then the TRACE facility can still be used and whenever an interrupt occurs, your routine will be called. Please note that if you don't return to the usual KERNAL IRQ routine after processing the interrupt, then the GRAPHIC command facility will not be available to you.

Example 7
IRQ FFA65 (first byte is the bank)

IRQ

Current address=FFA65 new address=xxxxx

Just pressing return here will exit this command without any changes. Otherwise, just enter the new address.

Again the default bank is BANK 0.

JUMP

Similar in use to the 'G' command in the monitor, this allows the facilities of the Analyser to be used on the program to be debugged.

Example 8
JUMP 02000

This causes the program counter to start executing in BANK 0 at address 2000.

You can jump to any of the 16 BANKS and this is the running bank until changed by the program to be debugged.

If only the address is entered, then the BANK defaults to 0.

LIST

This command will LIST an area of memory of a register.

Example 9
LIST
type (a/r) ... A
address ... FA000
length ... 50
mode (h/d/c) ... H

Note
A stands for address. Address to list from F is bank 15. Number of bytes to list in DECIMAL, max=255. H=hexadecimal, D=decimal, C=character.

Example 9 is similar to typing: MFA000 FA031.

Example 10
LIST
type (a/r) ...R
register ... X
mode (h/d/c) ... D

Note
Choices are A=accumulator, X=X register, Y=Y register, S=STATUS register, P=stack pointer.

Example 10 lists the contents of register X in decimal.

This command is usually used only in conjunction with the BP command, as described in the 'BP' command description above.

MON

This switches to the monitor. Command 'X' will return you to Analyser command line.

All commands in the monitor are available, but to use the Analyser properly, it is better not to use the G command, but the 'JUMP' command in the Analyser.

You can change memory, or change registers so that, on a GO or JUMP command, these will be the new values used.

DO NOT try to change the BANK in the monitor as this could have unpredictable effects.

Example 11
MON

PRINTER

This allows certain information to be displayed on the printer. The only information that is listed to printer is:
1. the list information when a breakpoint is encountered.
2. The TABLE information.
3. The information from the HELP command.
4. The WHERE information.
5. The LIST information from the LIST command.

The TRACE data CANNOT be put to printer because of the nature of the KERNAL software that drives the serial bus.

Example 12
PRINTER ON (output to printer).
PRINTER OFF (output to screen < ---default).

RESET

This will reset all screen definitions i.e. it will remove GRAPHIC and WINDOW facilities.

Example 13
RESET

SPLIT

This command is useful if the program to be debugged prints to the screen using the KERNAL print routines. It will divide all program output to the tophalf of the screen, and all Analyser output to the bottom half of the screen.

You specify the proportions for output.

Example 14
SPLIT 18

Will let the first 18 lines of the screen to be used by the program being debugged, and the other six lines used by the Analyser. The RESET command clears this feature.

TABLE

This lists all the breakpoints set at present whether the TRACE is set or not. It also displays what will be listed when that breakpoint is reached, or during a TRACE. If a '*' is displayed, then no information is displayed.

Example 14
TABLE

output:

ADDRESS	**LIST-INFO**	
024F0	*	-breakpoint at 024F0 no data listed
02343	R X H	-bp at 02343, X listed in hex
126E6	A 43F76 50C	-see (a)
TRACE	R A D	-Trace on and list acc in decimal

This lists 50 bytes from address 3F76 in BANK 4. The data listed is in character format.

TRACE

Command is used to either turn the TRACE on or off, and the LIST information is also defined here. The trace output is activated when a JUMP or GO command is entered.

Entering the list information is exactly the same as in the BP command.

Example 15
TRACE ON N

This sets the TRACE with no information to be listed.

Because of the way the TRACE works, every 1/50th of a second the program is interrupted and the system displays current position and any list information required.

It does NOT display information at every 6502 command. The data outputed by the TRACE cannot be sent to printer. When a TRACE is on, speed of execution is delayed. Control of the amount of dealy is via the DELAY command.

WHERE

This command lists the current address at which the program being debugged has been stopped.

Example 16
WHERE

WINDOW

If your program does direct access to the screen, you may want to have only

a small part of the screen disrupted by output from the Analyser. This is done via this command, and defines a window as in the Basic command.

Example 16
WINDOW
upper border ... 11
lower border ... 15
left border ... 15
right border ...25

This defines a window of height four, length 10 in the middle of the screen.

You can reset this using the RESET command or by pressing HOME twice.

Further Points

A message of 'EXTERN BRK ...' means that a BRK command has been encountered which was not set up by the Analyser.

As far as I know there is only one place you can't put a breakpoint: on the command JSR $FF7D. This is due to the way this KERNAL program works. There could be others, as you get to know this program, you will probably find similar situations.

Example 5 will restart execution from the latest breakpoint encountered which was set by the Analyser. It won't start execution from an externally set breakpoint (i.e. a BRK command you have to put in yourself). YC

PROGRAM: ANALYSER 128

```
10 BANK 0
20 COLOR 0,1:COLOR 4,1:COLOR 5,8
30 PRINT"[CLEAR]                ANALYS
ER LOADER"
40 PRINT"                ------------
--"
50 PRINT "[DOWN][DOWN][DOWN][DOW
N][DOWN]               ADDRESS ==> $
";
60 SA=59904
70 DO WHILE SA<65205 AND EE=0
80 : READ DT
90 : IF DT < 0 THEN BEGIN
100 :    IF ABS(DT) <> TT THEN EE
=1:ELSETT=0
110 : BEND:ELSE BEGIN
120 :   POKE SA,DT:TT=TT+DT
130 :   PRINT HEX$(SA);"[LEFT][LE
FT][LEFT][LEFT]";:SA=SA+1
140 :BEND
150 LOOP:PRINT
160 IF EE=1 THEN PRINT"[DOWN][DO
WN][DOWN][DOWN]ERROR IN LINE ";P
EEK(65)+PEEK(66)*256:ELSE BEGIN
170 : PRINT"[DOWN][DOWN][DOWN]SA
VING ANALYSER"
180 : BSAVE "ANALYSER",B0,P59904
 TO P65204
190 : PRINT "[DOWN][DOWN]PROGRAM
 SAVED"
200 BEND
210 DATA 32,24,250,32,50,253,147
,14,77,65,67,72,73,78,69,32,-133
5
220 DATA 67,79,68,69,32,65,78,65
,76,89,83,69,82,32,86,49,-1089
230 DATA 46,48,13,13,0,169,13,32
,249,252,169,93,32,249,252,160,-
1790
240 DATA 0,32,238,237,160,0,140,
108,235,32,165,234,162,0,189,228
,-2160
250 DATA 234,240,75,217,48,2,208
,5,200,232,76,62,234,160,0,238,-
2231
260 DATA 108,235,232,189,228,234
,208,250,232,189,228,234,208,229
,32,50,-3086
270 DATA 253,13,85,78,75,78,79,8
7,78,32,67,79,77,77,65,78,-1301
280 DATA 68,46,84,89,80,69,32,72
,69,76,80,32,70,79,82,32,-1060
290 DATA 67,79,77,77,65,78,68,83
,13,13,0,76,37,234,14,108,-1089
300 DATA 235,174,108,235,189,73,
235,141,164,234,189,72,235,141,1
63,234,-2822
310 DATA 108,163,234,255,0,152,7
2,138,72,162,0,172,227,234,48,31
,-2068
320 DATA 185,0,2,201,32,208,4,20
0,76,176,234,185,0,2,200,201,-19
06
330 DATA 32,240,12,201,13,240,7,
157,48,2,232,76,187,234,136,140,
-1957
340 DATA 227,234,142,226,234,169
,32,157,49,2,104,170,104,168,173
,226,-2417
350 DATA 234,96,0,255,77,79,78,0
,72,69,76,80-,0,87,72,69,-1344
360 DATA 82,69,0,74,85,77,80,0,7
1,79,0,66,80,0,84,82,-929
370 DATA 65,67,69,0,73,82,81,0,6
9,78,68,0,84,65,66,76,-943
380 DATA 69,0,87,73,78,68,79,87,
0,80,82,73,78,84,69,82,-1089
390 DATA 0,83,80,76,73,84,0,82,6
9,83,69,84,0,71,82,65,-1001
400 DATA 80,72,73,67,0,76,73,83,
84,0,68,69,76,65,89,0,-975
410 DATA 67,79,76,79,85,82,0,0,1
09,235,174,235,192,237,168,246,-
2064
420 DATA 213,246,241,243,208,247
,163,243,136,252,152,239,35,240,
192,249,-3299
430 DATA 234,248,245,249,141,248
,46,241,72,252,198,253,0,162,7,1
89,-2785
440 DATA 166,235,157,80,2,202,16
,247,169,0,133,252,133,253,168,1
69,-2382
450 DATA 10,133,254,169,80,32,10
1,243,169,2,200,32,101,243,173,0
,-1942
460 DATA 255,141,81,2,169,0,141,
129,2,169,58,141,134,2,169,176,-
1769
470 DATA 141,135,2,76,128,2,169,
6,141,0,255,76,37,234,32,91,-152
5
480 DATA 253,32,50,253,13,87,72,
69,82,69,32,45,32,80,82,79,-1330
490 DATA 71,82,65,77,32,67,85,82
,82,69,78,84,76,89,32,83,-1154
500 DATA 84,79,80,80,69,68,32,65
,84,13,66,80,32,45,32,83,-992
510 DATA 69,84,32,65,32,66,82,69
,65,75,80,79,73,78,84,13,-1046
520 DATA 84,82,65,67,69,32,45,32
,83,69,84,32,85,80,32,65,-1006
530 DATA 32,84,82,65,67,69,13,76
,73,83,84,32,45,32,76,73,-986
540 DATA 83,84,32,65,78,32,65,82
,69,65,32,79,70,32,77,69,-1014
550 DATA 77,79,82,89,13,69,78,68
,32,45,32,69,78,68,32,84,-995
560 DATA 72,69,32,65,78,65,76,89
,83,69,82,13,71,79,32,45,-1020
570 DATA 32,83,84,65,82,84,32,69
,88,69,67,85,84,73,79,78,-1154
580 DATA 32,65,70,84,69,82,32,65
,32,66,82,69,65,75,80,79,-1047
590 DATA 73,78,84,13,74,85,77,80
,32,45,32,69,88,69,67,85,-1051
600 DATA 84,69,32,70,82,79,77,32
,65,68,68,82,69,83,83,13,-1056
610 DATA 68,69,76,65,89,32,45,32
,68,69,76,65,89,32,84,82,-1041
620 DATA 65,67,73,78,71,32,83,80
,69,69,68,13,77,79,78,32,-1034
630 DATA 45,32,83,87,73,84,67,72
,32,84,79,32,77,79,78,73,-1077
640 DATA 84,79,82,13,73,82,81,32
,45,32,83,69,84,32,73,82,-1026
650 DATA 81,32,86,69,67,84,79,82
,13,84,65,66,76,69,32,45,-1030
660 DATA 32,76,73,83,84,32,65,76
,76,32,66,82,69,65,75,80,-1066
670 DATA 79,73,78,84,83,32,65,78
,68,32,84,82,65,67,69,83,-1122
680 DATA 13,87,73,78,68,79,87,32
,45,32,68,69,70,73,78,69,-1021
690 DATA 32,65,78,32,79,85,84,80
,85,84,32,87,73,78,68,79,-1121
700 DATA 87,13,83,80,76,73,84,32
,45,32,83,80,76,73,84,32,-1033
710 DATA 83,67,82,69,69,78,13,71
,82,65,80,72,73,67,32,45,-1048
720 DATA 32,65,76,76,79,87,32,71
,82,65,80,72,73,67,83,32,-1072
730 DATA 65,78,68,32,84,69,88,84
,13,82,69,83,69,84,32,45,-1045
740 DATA 32,67,76,69,65,82,32,71
,82,65,80,72,73,67,44,32,-1009
750 DATA 87,73,78,68,79,87,32,65
,78,68,32,83,80,76,73,84,-1143
760 DATA 13,67,79,76,79,85,82,32
,45,32,83,69,84,32,67,79,-1004
770 DATA 76,79,85,82,83,32,79,70
,32,83,67,82,69,69,78,13,-1079
780 DATA 80,82,73,78,84,69,82,32
,45,32,79,85,84,80,85,84,-1154
790 DATA 32,67,69,82,84,65,73,78
,32,73,78,70,79,32,84,79,-1077
800 DATA 32,80,82,73,78,84,69,82
,13,0,32,150,253,76,37,234,-1375
810 DATA 32,91,253,32,50,253,13,
80,82,79,71,82,65,77,32,65,-1357
820 DATA 84,32,45,0,165,2,133,25
2,165,4,133,253,165,3,133,254,-1
823
830 DATA 32,209,238,169,13,32,24
9,252,32,150,253,76,37,234,160,0
,-2136
840 DATA 32,34,253,153,0,2,200,2
01,13,240,9,192,47,144,241,169,-
1930
850 DATA 13,76,243,237,192,1,240
,6,169,0,141,227,234,96,104,104,
-2083
860 DATA 76,37,234,32,165,234,20
1,4,176,5,240,3,76,51,238,32,-18
04
870 DATA 50,253,13,79,78,47,79,7
0,70,46,46,46,0,32,238,237,-1384
880 DATA 76,19,238,173,48,2,201,
79,208,229,173,49,2,201,78,208,-
1984
```

```
890 DATA 6,169,1,141,81,238,96,2
01,70,208,212,169,0,141,81,238,-
2052
900 DATA 96,255,32,165,234,208,2
0,32,50,253,13,65,68,68,82,69,-1
710
910 DATA 83,83,46,46,0,32,238,23
7,76,82,238,160,0,201,6,176,-170
4
920 DATA 230,201,4,144,226,208,7
,169,63,133,252,76,143,238,173,4
8,-2315
930 DATA 2,32,198,238,201,16,176
,207,170,189,182,238,133,252,200
,162,-2596
940 DATA 1,185,48,2,32,198,238,2
01,16,176,188,10,10,10,10,149,-1
474
950 DATA 253,200,185,48,2,32,198
,238,201,16,176,171,24,117,253,1
49,-2263
960 DATA 253,200,202,16,220,96,6
3,127,191,255,22,86,150,214,42,1
06,-2243
970 DATA 170,234,6,10,1,0,56,233
,48,201,10,144,3,56,233,7,-1412
980 DATA 96,138,72,32,239,251,32
,254,238,173,253,238,32,249,252,
165,-2714
990 DATA 254,32,236,238,165,253,
32,236,238,104,170,96,32,254,238
,173,-2751
1000 DATA 252,238,32,249,252,173
,253,238,32,249,252,96,0,255,72,
41,-2684
1010 DATA 240,74,74,74,74,32,21,
239,141,252,238,104,41,15,32,21,
-1672
1020 DATA 239,141,253,238,96,201
,10,144,3,24,105,7,24,105,48,96,
-1734
1030 DATA 173,252,238,32,198,238
,10,10,10,10,141,59,239,173,253,
238,-2274
1040 DATA 32,198,238,24,109,59,2
39,141,59,239,96,255,138,72,152,
72,-2123
1050 DATA 160,2,169,0,153,113,23
9,136,16,250,173,59,239,56,233,1
0,-2008
1060 DATA 144,21,238,114,239,172
,114,239,192,10,208,241,238,113,
239,160,-2682
1070 DATA 0,140,114,239,76,77,23
9,105,10,141,115,239,104,168,104
,170,-2041
1080 DATA 96,255,0,255,169,0,206
,113,239,48,6,24,105,100,76,118,
-1810
1090 DATA 239,206,114,239,48,6,2
4,105,10,76,129,239,206,115,239,
48,-2043
1100 DATA 6,24,105,1,76,140,239,
96,32,91,253,32,50,253,13,13,-14
24
1110 DATA 65,68,68,82,69,83,83,3
2,32,32,32,76,73,83,84,45,-1007
1120 DATA 73,78,70,79,13,0,162,0
,189,166,245,142,34,240,240,46,-
1777
1130 DATA 201,42,240,52,189,167,
245,133,252,189,168,245,133,253,
189,169,-2867
1140 DATA 245,133,254,32,209,238
,32,50,253,32,32,32,32,32,0,-
1638
1150 DATA 189,175,245,32,249,252
,201,13,240,4,232,76,224,239,173
,34,-2578
1160 DATA 240,24,105,23,170,76,1
84,239,173,58,248,240,31,32,50,2
53,-2146
1170 DATA 84,82,65,67,69,32,32,3
2,32,32,32,0,162,0,189,59,-969
1180 DATA 248,32,249,252,201,13,
240,4,232,76,14,240,32,150,253,7
6,-2312
1190 DATA 37,234,0,32,165,234,24
0,4,201,3,144,25,32,50,253,13,-1
667
1200 DATA 85,80,80,69,82,32,66,7
9,82,68,69,82,46,46,0,32,-998
1210 DATA 238,237,76,35,240,32,2
47,240,201,24,176,224,141,244,24
0,32,-2627
1220 DATA 165,234,240,4,201,3,14
4,25,32,50,253,13,76,79,87,69,-1
675
1230 DATA 82,32,66,79,82,68,69,8
2,46,46,0,32,238,237,76,79,-1314
1240 DATA 240,32,247,240,201,1,1
44,224,205,244,240,144,219,141,2
43,240,-3005
1250 DATA 32,165,234,240,4,201,3
,144,24,32,50,253,13,76,69,70,-1
610
1260 DATA 84,32,66,79,82,68,69,8
2,46,46,0,32,238,237,76,128,-136
5
1270 DATA 240,32,247,240,201,40,
176,225,141,245,240,32,165,234,2
40,4,-2702
1280 DATA 201,3,144,25,32,50,253
,13,82,73,71,72,84,32,66,79,-128
0
1290 DATA 82,68,69,82,46,46,0,32
,238,237,76,171,240,32,247,240,-
1906
1300 DATA 201,1,144,224,205,245,
240,144,219,141,246,240,169,147,
32,249,-2847
1310 DATA 252,162,3,189,243,240,
149,228,202,16,248,169,147,32,24
9,252,-2781
1320 DATA 76,37,234,72,162,0,142
,138,72,162,0,142,113,239,142,11
4,-1845
1330 DATA 239,173,226,234,201,3,
144,10,173,48,2,32,198,238,141,1
13,-2175
1340 DATA 239,232,201,1,240,10,1
89,48,2,32,198,238,141,114,239,2
32,-2356
1350 DATA 189,48,2,32,198,238,14
1,115,239,104,170,76,116,239,32,
52,-1991
1360 DATA 241,76,37,234,173,244,
249,141,226,242,32,165,234,208,2
5,32,-2559
1370 DATA 50,253,13,79,85,84,80,
85,84,32,40,65,47,82,41,46,-1166
1380 DATA 46,0,32,238,237,76,58,
241,173,48,2,201,42,240,94,201,-
1929
1390 DATA 82,240,4,201,65,208,21
6,141,86,243,162,32,142,87,243,2
01,-2353
1400 DATA 65,208,3,76,32,242,32,
165,234,173,48,2,162,4,221,155,-
1822
1410 DATA 241,240,29,202,16,248,
32,50,253,13,82,69,71,73,83,84,-
1786
1420 DATA 69,82,46,46,0,32,238,2
37,76,118,241,83,65,88,89,80,-15
90
1430 DATA 141,88,243,169,32,141,
89,243,32,228,242,141,90,243,169
,13,-2304
1440 DATA 141,91,243,173,100,243
,240,6,169,0,141,100,243,96,173,
212,-2371
1450 DATA 246,240,10,173,206,247
,208,5,169,83,141,244,249,32,91,
253,-2597
1460 DATA 224,4,208,22,32,50,253
,13,83,84,65,67,75,32,80,79,-137
1
1470 DATA 73,78,84,69,82,61,0,76
,17,242,224,0,208,19,32,50,-1315
1480 DATA 253,13,83,84,65,84,85,
83,32,82,69,71,61,0,76,17,-1158
1490 DATA 242,169,13,32,249,252,
189,155,241,32,249,252,169,61,32
,249,-2586
1500 DATA 252,181,5,32,22,243,32
,150,253,173,226,242,141,244,249
,96,-2541
1510 DATA 32,82,238,174,226,234,
224,4,208,5,169,32,141,92,243,20
2,-2306
1520 DATA 189,48,2,157,88,243,20
2,16,247,169,32,141,93,243,32,16
5,-2067
1530 DATA 234,208,19,32,50,253,1
3,76,69,78,71,84,72,46,46,0,-135
1
1540 DATA 32,238,237,76,62,242,2
01,4,176,233,170,141,166,246,202
,189,-2615
1550 DATA 48,2,157,94,243,202,16
,247,32,247,240,141,227,242,32,2
28,-2398
1560 DATA 242,169,32,172,166,246
,153,94,243,173,48,2,153,95,243,
169,-2400
1570 DATA 13,153,96,243,173,100,
243,240,21,169,0,141,100,243,96,
173,-2204
1580 DATA 212,246,240,10,173,206
,247,208,5,169,83,141,244,249,32
,91,-2556
1590 DATA 253,169,13,32,249,252,
162,0,160,0,32,209,238,169,62,32
,-2032
1600 DATA 249,252,32,134,243,32,
22,243,200,232,236,227,242,240,2
5,192,-2801
1610 DATA 8,144,239,169,13,32,24
9,252,165,253,24,105,8,133,253,1
65,-2212
1620 DATA 254,105,0,133,254,76,1
68,242,32,150,253,173,226,242,14
1,244,-2693
1630 DATA 249,96,208,25,32,165,2
34,208,25,32,50,253,13,77,79,68,
-1814
1640 DATA 69,32,40,72,47,68,47,6
7,41,46,46,0,32,238,237,76,-1158
1650 DATA 228,242,173,48,2,201,7
2,240,8,201,67,240,4,201,68,208,
-2203
1660 DATA 216,141,21,243,96,72,1
41,59,239,152,72,173,21,243,201,
68,-2158
1670 DATA 240,22,201,67,208,9,17
3,59,239,32,249,252,76,78,243,17
3,-2321
1680 DATA 59,239,32,236,238,76,7
8,243,32,60,239,160,0,185,113,23
9,-2229
1690 DATA 32,254,238,173,253,238
,32,249,252,200,192,3,144,239,16
9,32,-2700
1700 DATA 32,249,252,104,168,96,
0,255,0,255,0,255,0,255,0,255,-2
176
1710 DATA 72,142,157,243,169,72,
142,162,243,169,253,141,185,2,16
5,252,-2569
1720 DATA 32,239,251,170,169,119
,141,144,2,169,255,141,145,2,104
,32,-2115
1730 DATA 23,253,174,162,243,96,
142,162,243,165,252,32,239,251,1
70,169,-2776
```

```
1740 DATA 116,141,144,2,169,255,141,145,2,169,253,32,23,253,174,162,-2181
1750 DATA 243,96,73,32,50,253,13,73,82,81,32,65,68,68,82,69,-1380
1760 DATA 83,83,32,61,32,0,162,2,189,238,243,149,252,202,16,248,-1992
1770 DATA 32,209,238,32,50,253,13,78,69,87,32,65,68,68,82,69,-1445
1780 DATA 83,83,32,61,32,0,32,238,237,32,82,238,165,252,141,238,-1946
1790 DATA 243,165,253,141,239,243,165,254,141,240,243,76,37,234,32,126,-2832
1800 DATA 252,32,82,238,165,252,41,64,240,5,169,127,76,1,244,169,-2157
1810 DATA 63,133,252,32,19,238,173,81,238,208,3,76,83,245,32,143,-2019
1820 DATA 247,208,59,162,0,189,166,245,201,0,240,50,201,42,240,8,-2258
1830 DATA 138,24,105,23,170,76,21,244,32,50,253,13,78,79,32,83,-1421
1840 DATA 80,65,67,69,32,84,79,32,68,69,70,73,78,69,32,66,-1033
1850 DATA 82,69,65,75,80,79,73,78,84,13,0,76,37,234,142,167,-1354
1860 DATA 246,165,252,157,167,245,165,253,157,168,245,165,254,157,169,245,-3210
1870 DATA 160,0,32,134,243,157,170,245,232,200,192,3,144,244,169,0,-2325
1880 DATA 168,32,101,243,174,167,246,189,170,245,41,15,240,24,201,9,-2265
1890 DATA 240,40,141,166,246,41,8,208,3,76,227,244,173,166,246,41,-2266
1900 DATA 4,240,33,76,196,244,189,170,245,240,25,201,32,240,37,201,-2373
1910 DATA 64,240,17,201,96,240,13,76,227,244,189,170,245,41,16,240,-2319
1920 DATA 50,76,196,244,169,234,157,171,245,157,172,245,169,1,157,166,-2609
1930 DATA 245,76,201,244,169,3,157,166,245,142,34,240,32,73,248,160,-2435
1940 DATA 0,174,34,240,185,86,243,157,175,245,232,200,192,14,144,244,-2565
1950 DATA 76,37,234,169,234,157,172,245,169,2,157,166,245,189,170,245,-2667
1960 DATA 41,15,208,213,189,170,245,201,224,240,206,201,160,240,202,201,-2956
1970 DATA 192,240,198,189,171,245,41,128,240,30,169,254,56,253,171,245,-2822
1980 DATA 141,166,246,189,168,245,56,237,166,246,157,173,245,189,169,245,-3038
1990 DATA 233,0,157,174,245,76,75,245,189,168,245,24,125,171,245,157,-2529
2000 DATA 173,245,189,169,245,105,0,157,174,245,189,173,245,24,105,2,-2440
2010 DATA 157,173,245,189,174,245,105,0,157,174,245,169,4,157,171,245,-2610
2020 DATA 76,201,244,32,143,247,240,40,169,0,157,166,245,160,0,189,-2309
2030 DATA 170,245,32,101,243,32,50,253,13,66,82,69,65,75,80,79,-1655
2040 DATA 73,78,84,32,82,69,77,79,86,69,68,13,0,76,37,234,-1157
2050 DATA 32,50,253,13,78,79,32,66,82,69,65,75,80,79,73,78,-1204
2060 DATA 84,32,65,84,32,84,72,73,83,32,65,68,68,82,69,83,-1076
2070 DATA 83,13,0,76,37,234,83,13,0,76,37,234,0,255,0,255,-1396
2080 DATA 0,255,0,255,0,255,0,255,0,255,0,255,0,255,0,255,-2040
2090 DATA 0,255,0,255,0,255,0,255,0,255,0,255,0,255,0,255,-2040
2100 DATA 0,255,0,255,0,255,0,255,0,255,0,255,0,255,0,255,-2040
2110 DATA 0,255,0,255,0,255,0,255,0,255,0,255,0,255,0,255,-2040
2120 DATA 0,255,0,255,0,255,0,255,0,255,0,255,0,255,0,221,-2006
2130 DATA 0,255,0,255,0,255,0,255,0,255,0,255,0,255,0,255,-2040
2140 DATA 0,255,0,255,0,255,0,255,0,255,0,255,0,255,0,255,-2040
2150 DATA 0,255,0,255,0,255,0,255,0,255,0,255,0,255,0,255,-2040
2160 DATA 0,255,0,255,0,255,0,255,0,255,0,255,0,255,0,255,-2040
2170 DATA 0,255,0,255,0,255,0,255,0,255,0,255,0,255,0,255,-2040
2180 DATA 0,255,0,255,0,255,0,255,0,255,0,255,0,255,0,255,-2040
2190 DATA 0,255,0,255,0,255,0,255,0,255,0,255,0,255,0,255,-2040
2200 DATA 0,255,0,255,0,255,0,255,0,255,0,255,0,255,0,255,-2040
2210 DATA 0,255,0,255,0,255,0,255,0,255,0,255,0,255,0,255,-2040
2220 DATA 0,255,0,255,0,255,0,255,0,255,0,255,0,255,0,255,-2040
2230 DATA 0,255,0,255,0,255,0,255,32,82,238,32,34,252,165,252,-2107
2240 DATA 32,239,251,133,2,165,253,133,4,165,254,133,3,169,1,141,-2078
2250 DATA 212,246,169,113,141,144,2,169,255,141,145,2,169,76,141,143,-2268
2260 DATA 2,76,136,2,141,173,206,247,208,44,32,50,253,13,78,79,-1740
2270 DATA 84,32,83,84,79,80,80,69,68,32,66,89,32,65,32,83,-1058
2280 DATA 89,83,84,69,77,32,66,82,69,65,75,80,79,73,78,84,-1185
2290 DATA 46,13,0,76,37,234,169,0,141,206,247,165,2,133,252,165,-1886
2300 DATA 3,133,254,165,4,133,253,32,143,247,208,3,76,128,245,142,-2169
2310 DATA 34,240,160,17,185,125,247,153,80,2,136,16,247,165,2,141,-1950
2320 DATA 83,2,160,0,189,170,245,153,89,2,232,200,192,3,144,244,-2108
2330 DATA 174,34,240,189,168,245,24,125,166,245,141,93,2,189,169,245,-2449
2340 DATA 105,0,141,94,2,189,173,245,141,96,2,189,174,245,141,97,-2034
2350 DATA 2,162,4,189,120,247,157,0,2,202,16,247,162,0,142,227,-1879
2360 DATA 234,76,168,246,141,0,255,76,48,50,53,48,13,8,72,169,-1657
2370 DATA 0,141,0,255,104,40,234,234,234,76,0,0,76,0,0,165,-1559
2380 DATA 252,41,64,240,5,169,127,76,156,247,169,63,141,207,247,162,-2366
2390 DATA 0,189,166,245,240,29,201,42,240,33,189,167,245,205,207,247,-2645
2400 DATA 208,17,189,168,245,197,253,208,10,189,169,245,197,254,208,3,-2760
2410 DATA 169,1,96,138,24,105,23,170,76,161,247,169,0,96,76,167,-1718
2420 DATA 32,19,238,173,81,238,208,58,173,58,248,208,21,32,50,253,-2090
2430 DATA 13,84,82,65,67,69,32,78,79,84,32,79,78,13,0,76,-931
2440 DATA 37,234,169,0,141,58,248,32,50,253,13,84,82,65,67,69,-1602
2450 DATA 32,83,87,73,84,67,72,69,68,32,79,70,70,13,0,76,-975
2460 DATA 37,234,169,1,141,100,243,141,58,248,32,73,248,162,13,189,-2089
2470 DATA 86,243,157,59,248,202,16,247,32,50,253,13,84,82,65,67,-1904
2480 DATA 69,32,83,69,84,13,0,76,37,234,84,13,0,76,37,234,-1141
2490 DATA 0,255,0,255,0,255,0,255,0,32,165,234,208,32,32,50,-1773
2500 DATA 253,13,76,73,83,84,47,78,79,76,73,83,84,32,40,76,-1250
2510 DATA 47,78,41,32,46,46,46,0,32,238,237,76,73,248,173,48,-1461
2520 DATA 2,201,76,240,15,201,78,208,213,169,42,141,86,243,169,13,-2097
2530 DATA 141,87,243,96,169,1,141,100,243,32,52,241,96,32,165,234,-2073
2540 DATA 208,34,32,50,253,13,69,78,84,69,82,32,76,73,78,69,-1300
2550 DATA 32,80,79,83,73,84,73,79,78,32,46,46,46,0,32,238,-1101
2560 DATA 237,76,141,248,201,3,176,218,32,247,240,201,25,176,211,10,-2442
2570 DATA 10,10,24,105,47,162,52,134,253,162,10,134,254,162,0,134,-1653
2580 DATA 252,160,0,32,101,243,32,50,253,13,71,82,65,80,72,73,-1579
2590 DATA 67,32,83,69,84,13,0,76,37,234,32,165,234,208,26,32,-1392
2600 DATA 50,253,13,78,79,32,79,70,32,76,73,78,69,83,32,46,-1143
2610 DATA 46,46,0,32,238,237,76,234,248,201,3,176,226,32,247,240,-2282
2620 DATA 201,23,176,219,141,114,249,32,175,249,169,83,141,244,249,169,-2634
2630 DATA 147,32,249,252,32,115,249,173,114,249,240,67,133,229,169,147,-2597
2640 DATA 32,249,252,32,50,253,45,45,45,45,45,45,45,45,45,45,-1318
2650 DATA 45,45,45,45,45,45,45,45,45,45,45,45,45,45,45,45,-720
2660 DATA 45,45,45,45,45,45,45,45,45,45,45,45,45,45,0,173,-803
```

```
2670 DATA 114,249,24,105,1,141,1
14,249,133,229,169,147,32,249,25
2,76,-2284
2680 DATA 37,234,32,162,3,181,22
4,157,157,249,181,232,157,161,24
9,202,-2618
2690 DATA 16,243,165,236,141,165
,249,96,162,3,181,224,157,166,24
9,181,-2634
2700 DATA 232,157,170,249,202,16
,243,165,236,141,174,249,96,165,
236,141,-2872
2710 DATA 180,249,96,255,0,255,0
,255,0,42,0,255,0,255,0,72,-1914
2720 DATA 169,0,133,230,133,229,
169,39,133,231,169,24,133,228,10
4,96,-2220
2730 DATA 32,19,238,32,50,253,13
,80,82,73,78,84,69,82,32,0,-1217
2740 DATA 173,81,238,240,15,169,
80,141,244,249,32,50,253,79,78,1
3,-2135
2750 DATA 0,76,37,234,169,83,141
,244,249,32,50,253,79,70,70,13,-
1800
2760 DATA 0,76,37,234,70,32,175,
249,169,147,32,249,252,169,47,16
2,-2100
2770 DATA 52,134,253,162,10,134,
254,162,0,134,252,160,0,32,101,2
43,-2083
2780 DATA 169,0,141,114,249,76,3
7,234,162,0,169,0,157,166,245,13
8,-2057
2790 DATA 24,105,23,176,4,170,76
,26,250,233,23,169,42,157,166,24
5,-1889
2800 DATA 169,0,141,212,246,141,
58,248,141,100,243,141,206,247,1
41,114,-2548
2810 DATA 249,169,83,141,244,249
,162,41,189,134,250,157,112,2,20
2,16,-2400
2820 DATA 247,173,0,255,141,113,
2,141,121,2,141,148,2,169,112,14
1,-1908
2830 DATA 22,3,169,2,141,23,3,12
0,32,120,252,173,22,3,24,105,-12
14
2840 DATA 8,141,20,3,173,23,3,10
5,0,141,21,3,88,169,153,141,-119
2
2850 DATA 162,254,141,163,254,96
,169,6,141,0,255,76,176,250,169,
6,-2318
2860 DATA 141,0,255,76,47,251,16
9,0,141,0,255,76,0,0,72,169,-165
2
2870 DATA 0,141,0,255,104,32,0,0
,72,169,63,141,0,255,104,96,-143
2
2880 DATA 169,1,141,206,247,169,
0,141,212,246,32,255,251,32,207,
251,-2560
2890 DATA 88,32,91,253,165,4,56,
233,2,133,4,133,253,165,3,233,-1
848
2900 DATA 0,133,3,133,254,165,2,
133,252,32,143,247,240,51,160,0,
-1948
2910 DATA 189,175,245,153,0,2,20
0,232,192,14,144,244,32,50,253,1
3,-2138
2920 DATA 83,84,79,80,80,69,68,3
2,65,84,32,45,32,0,32,209,-1074
2930 DATA 238,169,13,32,249,252,
169,0,141,227,234,32,150,253,76,
46,-2281
2940 DATA 241,32,50,253,13,69,88
,84,69,82,78,32,66,82,75,32,-134
6
2950 DATA 65,84,32,45,32,0,32,20
9,238,32,150,253,76,37,234,173,-
1692
2960 DATA 212,246,240,126,173,58
,248,240,94,32,255,251,32,207,25
1,165,-2830
2970 DATA 3,133,254,165,4,133,25
3,165,2,133,252,32,50,253,13,67,
-1912
2980 DATA 72,69,67,75,73,78,71,3
2,73,78,32,65,84,32,45,32,-978
2990 DATA 0,32,209,238,169,13,32
,249,252,162,13,189,59,248,157,0
,-2022
3000 DATA 2,202,16,247,162,0,142
,227,234,32,52,241,32,34,252,172
,-2047
3010 DATA 119,252,162,0,202,208,
253,136,208,250,162,0,181,3,72,2
32,-2440
3020 DATA 224,6,208,248,165,2,72
,165,213,201,63,240,38,173,238,2
43,-2499
3030 DATA 141,129,2,173,239,243,
141,134,2,173,240,243,141,135,2,
76,-2214
3040 DATA 128,2,169,0,141,129,2,
169,101,141,134,2,169,250,141,13
5,-1813
3050 DATA 2,208,236,32,207,251,1
69,0,141,212,246,88,76,37,234,10
4,-2243
3060 DATA 141,237,251,104,141,23
8,251,104,133,2,133,252,162,5,10
4,149,-2407
3070 DATA 3,202,16,250,173,238,2
51,72,173,237,251,72,96,72,173,1
62,-2441
3080 DATA 0,189,182,238,197,252,
240,5,232,224,16,144,244,138,96,
173,-2570
3090 DATA 114,249,240,29,133,229
,169,24,133,228,32,115,249,162,3
,189,-2298
3100 DATA 166,249,149,224,189,17
0,249,149,232,202,16,243,173,174
,249,133,-2967
3110 DATA 236,96,173,114,249,240
,32,56,233,2,133,228,169,0,133,2
29,-2323
3120 DATA 32,136,249,162,3,189,1
57,249,149,224,189,161,249,149,2
32,202,-2732
3130 DATA 16,243,173,165,249,133
,236,96,32,165,234,240,4,201,4,1
44,-2335
3140 DATA 29,32,50,253,13,65,77,
79,85,78,84,32,40,48,46,46,-1057
3150 DATA 50,53,53,41,46,46,46,0
,32,238,237,76,72,252,32,247,-15
21
3160 DATA 240,141,119,252,76,37,
234,141,169,101,141,239,243,169,
250,141,-2693
3170 DATA 240,243,169,0,141,238,
243,96,162,0,189,166,245,240,27,
201,-2600
3180 DATA 42,240,31,189,167,245,
133,252,189,168,245,133,253,189,
169,245,-2890
3190 DATA 133,254,160,0,189,170,
245,32,101,243,138,24,105,23,170
,76,-2063
3200 DATA 138,252,32,175,249,169
,3,141,22,3,169,176,141,23,3,120
,-1816
3210 DATA 169,101,141,20,3,169,2
50,141,21,3,88,169,0,133,252,133
,-1793
3220 DATA 253,168,169,10,133,254
,169,3,32,101,243,169,64,200,32,
101,-2101
3230 DATA 243,32,50,253,13,65,78
,65,76,89,83,69,82,32,69,78,-137
7
3240 DATA 68,69,68,13,13,0,76,14
8,235,72,169,210,141,144,2,169,-
1597
3250 DATA 255,141,145,2,173,163,
254,32,23,253,104,72,32,23,253,1
73,-2098
3260 DATA 162,254,32,23,253,104,
96,72,169,32,141,143,2,104,32,13
6,-1755
3270 DATA 2,96,72,169,207,141,14
4,2,169,255,141,145,2,104,32,23,
-1704
3280 DATA 253,96,72,138,72,152,7
2,160,0,186,254,4,1,208,3,254,-1
925
3290 DATA 5,1,189,4,1,133,206,18
9,5,1,133,207,177,206,240,5,-170
2
3300 DATA 32,249,252,144,229,104
,168,104,170,104,96,72,152,72,13
8,72,-2158
3310 DATA 173,244,249,201,80,208
,41,169,10,162,7,160,4,133,184,1
34,-2159
3320 DATA 185,132,186,169,0,133,
183,169,192,141,144,2,169,255,14
1,145,-2346
3330 DATA 2,32,23,253,176,10,169
,201,141,144,2,162,10,32,23,253,
-1633
3340 DATA 104,170,104,168,104,96
,72,152,72,138,72,173,244,249,20
1,80,-2199
3350 DATA 208,33,169,13,32,249,2
52,169,204,141,144,2,169,255,141
,145,-2326
3360 DATA 2,32,23,253,169,195,14
1,144,2,169,10,32,23,253,169,13,
-1630
3370 DATA 32,249,252,76,144,253,
32,165,234,240,4,201,3,144,27,32
,-2088
3380 DATA 50,253,13,66,79,82,68,
69,82,32,67,79,76,79,85,82,-1262
3390 DATA 46,46,46,0,32,238,237,
76,198,253,32,247,240,201,16,176
,-2084
3400 DATA 222,141,160,254,32,165
,234,240,4,201,3,144,26,32,50,25
3,-2161
3410 DATA 13,80,65,80,69,82,32,6
7,79,76,79,85,82,46,46,46,-1027
3420 DATA 0,32,238,237,76,244,25
3,32,247,240,201,16,176,223,141,
161,-2517
3430 DATA 254,32,165,234,240,4,2
01,3,144,23,32,50,253,13,73,78,-
1799
3440 DATA 80,85,84,32,73,78,75,4
6,46,46,0,32,238,237,76,33,-1261
3450 DATA 254,32,247,240,201,16,
176,226,205,161,254,240,221,170,
189,164,-2996
3460 DATA 254,141,162,254,32,165
,234,240,4,201,3,144,24,32,50,25
3,-2193
3470 DATA 13,79,85,84,80,85,84,3
2,73,78,75,46,46,46,0,32,-938
3480 DATA 238,237,76,84,254,32,2
47,240,201,16,176,225,170,189,16
4,254,-2803
3490 DATA 141,163,254,169,0,168,
133,252,169,32,133,253,169,208,1
33,254,-2631
3500 DATA 173,160,254,32,101,243
,200,173,161,254,32,101,243,76,3
7,234,-2474
3510 DATA 32,96,243,76,144,5,28,
159,156,30,31,158,129,149,150,15
1,-1737
3520 DATA 152,153,154,155,234,-8
48
```

Listings

Get it right first time with our deluxe program system for the C64.

You may have noticed that our listings are free of those horrible little black blobs which send you searching around the keyboard for a suitable graphic symbol. You may also have noticed the funny numbers by the side of each line of the listing. Fret no more, it's all part of our easy entry aid.

Instead of those nasty graphics and rows of countless spaces in PRINT statements and strings we use a special coding system. The code, or mnemonic, is always contained in square brackets and you'll soon learn to decipher their meanings.

For example, [SA] would mean type in a Shifted A, or an ace of spades in layman's terms, and [SA10] would mean a row of ten of these symbols.

[S+2] means hold down the shift key and press the plus key twice. It doesn't take a great leap of logic to realise that [C+2] means exactly the same thing except that the Commodore key (bottom left of the keyboard) is held down instead of the shift key.

If more than two spaces appear in a statement then this will be printed as [SPC4] or, exceptionally, [SSPC4]. Translated into English this means press the spacebar four times or in the latter case hold the shift key down while you do it.

A string of special characters could appear as:

[CTRL N, DOWN2,LEFT5,BLUE, F3,C3]

This would be achieved by holding down the CTRL key as you press N, press the cursor key down twice, the cursor left key five times, press the key marked BLUE while holding down the CTRL key, press the F3 key and, finally hold the Commodore key down while pressing the number two key (C2 would of course make the computer print in brown).

Always remember that you should only have a row of graphics characters on your screen with no square brackets and no commas, unless something like this appears:

[SS],[C*]

In this case the two characters should have a comma between them.

On rare occasions [REV T] will appear in a listing. This is a delete symbol and is created by entering the line up to this mnemonic. Then type a closing quotation mark (SHIFT & 2) and delete it. This gets the computer out of quotes mode. Hold down CTRL and press the number nine key (RVSON), type the relevant number of reversed T's and then hold down CTRL and press zero (RVSOFF). Next type another quotation mark and delete it again. Now finish the line and press RETURN.

A list of these special cases is given in the table but remember that only one of these mnemonics will appear outside of a PRINT string: the symbol for pi. This may appear when its value is needed in a calculation so this may look something like:

:CC=2*[PI]*R:

Ignore the square brackets and just type in a shifted upward pointing arrow (ie. the pi symbol).

```
PROGRAM: SYNTAX CHECKER

5 REM SYTAX CHECKER - ERIC DOYLE

10 BL=10    :LN=70    :SA=49152
20 FOR L=0 TO BL:CX=0:FOR D=0 TO
 15
30 READ A:IF A>255THENPRINT"NUMB
ER TO LARGE";LN+(L*10):STOP
40 CX=CX+A:POKE SA+L*16+D,A:NEXT
 D
50 READ A:IF A><CX THENPRINT"ERR
OR IN LINE";LN+(L*10):STOP
60 NEXT L:SYS 49152:NEW
70 DATA 173,5,3,201,165,208,31,1
20,169,9,141,32,208,141,33,208,1
847
80 DATA 169,7,141,134,2,169,13,3
2,210,255,169,64,141,4,3,169,168
2
90 DATA 192,141,5,3,88,96,120,16
9,124,141,4,3,169,165,141,5,1566

100 DATA 3,169,14,141,134,2,141,
32,208,169,6,141,33,208,88,96,15
85
110 DATA 32,124,165,72,138,72,15
2,72,162,0,165,20,133,254,165,21
,1747
120 DATA 24,101,254,133,254,189,
0,2,240,18,69,254,133,254,232,18
9,2346
130 DATA 0,2,240,8,24,101,254,13
3,254,232,208,233,169,1,141,134,
2134
140 DATA 2,165,254,74,74,74,74,3
2,156,192,32,210,255,165,254,41,
2054
150 DATA 15,32,156,192,32,210,25
5,169,13,32,210,255,169,13,32,21
0,1995
160 DATA 255,169,7,141,134,2,104
,168,104,170,104,96,24,105,48,20
1,1832
170 DATA 58,16,1,96,24,105,7,96,
0,0,0,0,0,0,0,0,403
```

by Eric Doyle

Checksum Program

The hexadecimal numbers appearing in a column to the left of the listing should not be typed in with the program. These are merely checksum values and are there to help you get each line right. Don't worry if you don't understand the hexadecimal system, as long as you can compare two characters on the screen with the corresponding two characters in the magazine you can use our line checking program.

Type in the Checksum Program, make sure that you've not made any mistakes and save it to tape or disk immediately because it will be used with most of the present and future listings appearing in Your Commodore.

At the start of each programming session, load Checksum and run it. The screen will turn brown with yellow characters and each time you type in a line and press the RETURN key a number will appear on the screen in white. This should be the same as the corresponding value in the magazine.

If the two values don't relate to one another, you have not copied the line exactly as printed so go back and check each character carefully. When you find the error simply correct it and press RETURN again.

If you want to turn off the checker simply type SYS49152 and the screen will return to the familiar blue colours. You can then do whatever it was you wanted to do and if this doesn't use the area where Checksum lies you can go back to it with the same SYS command.

No system is foolproof but the chances of two errors cancelling one another out are so remote that we believe our listings are more reliable than any other magazine in the world. So get typing! YC

Mnemonic	Symbol	Keypress
[RIGHT]		CRSR left/right
[LEFT]		SHIFT & CRSR left/right
[DOWN]		CRSR up/down
[UP]		SHIFT & CRSR up/down
[F1]		f1 key
[F2]		SHIFT & f1 key
[F3]		f3 key
[F4]		SHIFT & f3 key
[F5]		f5 key
[F6]		SHIFT & f5 key
[F7]		f7 key
[F8]		SHIFT & f7 key
[HOME]		CLR/HOME
[CLR]		SHIFT & CLR/HOME
[RVSON]		CTRL & 9
[RVSOFF]		CTRL & 0

Mnemonic	Symbol	Keypress
[BLACK]		CTRL & 1
[WHITE]		CTRL & 2
[RED]		CTRL & 3
[CYAN]		CTRL & 4
[PURPLE]		CTRL & 5
[GREEN]		CTRL & 6
[BLUE]		CTRL & 7
[YELLOW]		CTRL & 8
[POUND]		£
[LARROW]		←
[UPARROW]		↑
[PI]		SHIFT & ↑
[INST]		SHIFT & INST/DEL
[REV T]		see text
[Cletter]		CBM + letter
[Sletter]		SHIFT + letter

YOUR COMMODORE

**Lineage: 45p per word.
(52p incl. VAT).
Semi display: £9.70 per single column centimetre (plus VAT) minimum 2 cm. Ring for information on series bookings/discounts.**

All advertisements in this section must be prepaid.
Advertisements are accepted subject to the terms and conditions printed on the advertisement rate card (available on request).

**01-437 0699
EXT. 292**

**Send your requirements to:
NICOLA BATY
ASP LTD, 1 GOLDEN SQUARE,
LONDON W1**

HARDWARE

TAPE BACK-UP BOARDS
FOR CBM-64/128 VIC-20

Mk. 1 uses a second CBM cassette deck to copy a program as it loads. **£8.95 inc p&p.**
NEW IMPROVED Mk.2. has a built in speaker so you can hear your copy being made. This board works like the Mk. 1 or can be switched to use our 'GENERATOR' software method. This can produce a better copy than the original. **£14.00 inc p&p.**
ROM SWITCH/RESET BOARD resets ALL programs that a standard switch can't. A socket for an 8k Eprom included. Full instructions supplied.
£8.00 inc p&p

All products guaranteed for 12 months. Send your cheque/P.O. or stamp for details to:

TURBOTRONIC
**46 Ripon Street, Parkinson Lane, Halifax, West Yorkshire HX1 3UG.
Tel: (0422) 52020**
(Overseas customers inside Europe add 50p outside Europe add £1.50)

1540/1541 OWNERS

Use both sides of your disks *Without* cutting holes in them. Disk doubler can be fitted in seconds using only a screwdriver.
Special Offer – ONLY **£4.00**
PANDASOFT(2), PO BOX 185, READING RG6 4EA

WANTED

WANTED: Your non-working Sinclair computers and equipment for cash. Ring D.M.R. Electonics, Bradford, (0274) 882892.

SERVICES

NEED A GOOD PRINTER? Anything printed from 1541 disks or data cassettes with DPS 1101 Daisywheel. Comprehensive word/data processing. Tel: 0202 37743.

FOR HIRE

HIRE HIRE

STAFFS COMPUTER LIBRARY
CBM 64 OWNERS

Join the friendly Library. We give you what you want. If a title is not on our list then we will get it, if it's still available.
(Games only)

- All the latest Titles
- Full 7 Days Hire
- Low Hire Cost. From 75p
- Up to 4 Games per week
- All games original
- Lots of American Titles
- Low Hard and Software prices
- Membership ONLY £5.00

Free m/c Monitor on joining

Send your cheques/postal orders payable to:
**STAFF COMPUTERS
The Newlands, Greensome Lane, Stafford**

SOFTWARE

BANKER 64 II

If you are fed up not being able to keep track of your bank account this program may be just what you are looking for. Simple to use as it is menu driven, it will hold full details of Credits, Debits, Standing Orders and Direct Debits, and will automatically place them in date order. It will give you statements to screen or printer including the 1520 plotter printer. Records can be stored on both disk and tape normally yearly, but can be stored up to 12 times per year for larger users. Entry to any account is by name and Security code, which can be changed as necessary. This m/c program is very good value at **£8.25 disk, £6.75 tape.**

RAMFILE II

Keep track of your Software, Records, Stamp Collection, Addresses etc. with this easy to use Menu driven filing system. Entry titles are user definable. Powerful options include search and amend routines. Printer routines allows printing of entry title, selected entry or complete files can be printed to Commodore and Epson compatible printers, including the 1520 plotter. Files can be stored on both disk and tape. Also included is an envelope print facility (not for 1520).
This m/c program is very good value at **£8.25 disk, £6.75 tape.**
Special Offer – Both programs £12.37 Disk. Both programs £10.12 Tape.
All prices include VAT, P&P. Cheques & PO to:

**RJP ELECTRONICS
27 Denham Way, Camber, Rye, East Sussex TN31 7XP
Tel: (0797) 225549**
* UPDATES OF EACH ORIGINAL PROGRAM CAN BE OBTAINED FOR £2.75 *

ATTENTION ALL CBM 64/128 USERS
Simon's Basic **£9.99 + £1.00 p&p**
(ROM Cartridge) (Special Offer)
114 Additional Programming Commands
R.R.P. £50.00
Send cheque or postal orders to:
**Simply Software Ltd, 241 Hull Road, Anlaby Common, Hull, North Humberside, HU4 7RY
Tel: (0482) 565516**
Other incredible software bargains always stocked for all machines.

JUST RELEASED for the C64. S-forth. Forth language on disk £24.90. S-lisp. Lisp language on cartridge £44.90. A. Shraddhan, 45 Swift Close, Letchworth, Herts SG6 4LL. Tel: (0462) 675305.

EDUCATIONAL SOFTWARE

UNDERSTANDING SHAPES AND NUMBERS

Educate & entertain your Child
Addition, subtraction & shape recognition using advanced graphics, turtle graphics, sprites & animation.
Free input selection for problem solving.
Suitable for 3-5 year age group.
DISK ONLY (C64/128): **£5.95** (post paid)
E. MILLS, 43 CHANCEL CLOSE, NAILSEA, BRISTOL BS19 2NE.

FURNITURE

HOME COMPUTER/GENERAL PURPOSE CHAIR
(see previous issues for picture)
OVER 30% OFF M.R.R.P. (£46.98)

OPERATE YOUR COMMODORE IN COMFORT
£31.99 + £3 p&p

These fully adjustable posture chairs are designed and manufactured for use in a punishing office environment. British made, with over 10,000 having been sold nationwide. NOW AVAILABLE DIRECT TO YOU!!!
Upholstered in either Dark Brown or Charcoal Grey hard wearing contract tweed. (Meets B.S.5852 cigarette and butane flame test). Comes to you packed in a box with full instructions for easy assembly.
Full 12 Month guarantee.
Only **£31.99** + £3 p&p & ins. (m.r.r.p. **£46.98**)
qty.......... P.C.1 (Dark Brown Tweed)
qty.......... P.C.2 (C/Coal Grey Tweed)

We will endeavour to despatch all orders within 14 days, but please allow up to 28 days for delivery.

Please make Cheques/P.O.'s payable to:
**HARVEC SUPPLIES AND SEND TO:
HARVEC SUPPLIES,
P.O. BOX 41,
BLACKBURN BB1 1ND.**

SPECIAL OFFERS

BITS AND PCs

**6 ALNESS CLOSE, KETTERING, NORTHAMPTONSHIRE
NN15 5BJ**

COMMODORE PSUs **£18**
3.50in DD/DS DISCS **£15**
5.25in ex-DEMO DISCS **£4.75** for 10.
All prices include p&p.

FOR FURTHER ENQUIRIES:
TEL: 0536-516709

**COMMODORE CHIPS
FOR SALE**

6510 £15.00 **6526 £13.00**
6569 R3 £13.00 **901226 £10.00**
901227 £10.00
Prices inc. P&P + VAT.
**BOWES ELECTRONICS INTERNATIONAL LTD.
24 Potters Lane, Kiln Farm, Milton Keynes, MK11 3A5.
Tel: (0908) 568476**

WARNING NOTICE

Advertisements placed in this magazine are to be in strict compliance with our standard conditions (copies of which conditions are available on request) and on the clear understanding that the advertiser warrants that his advertisement(s) does not infringe any copyright or condition of sale of any interested party in the advertised product.

Further, the advertiser indemnifies the proprietors of this magazine in respect of costs, damages, or any other claims brought against them as a result of legal action arising from the publication of the advertisement.

Any breach of these terms or the said conditions may result in prosecution of the advertiser by the proprietors.

Repairs Guide

CALL

NICOLA BATY

ON

01 — 437 0699

COMMODORE REPAIRS
COMMODORE REPAIRS BY
COMMODORE APPROVED ENGINEERS.

CBM Power Supplies

C64/+4/128/Vic 20	£15.00
VIC 20 Modulators	£8.05
CBM 64/CBM+4/CBM 16	from £20.00
CBM Disc Drives	from £20.00
128/128D	from £35.00

ATARI REPAIRS ALSO
For more details write with SAE or Telephone:
G. C. BUNCE & SON
36 Burlington Road, Burnham, Bucks SL1 7BQ
Tel: (06286) 61696 Mon-Fri 9am-6pm

Walkers
COMPUTER SERVICE AND REPAIRS BY THE SPECIALIST

Commodore 64	£32.00	Vic 20, C16, C128
Spectrum/+	£20.00	C+4 & BBC
ZX81	£15.00	All £20 + Parts
Interface I	£18.00	
Interface II	£10.00	
Microdrive	£15.00	

All Repairs Carry 3 Months Guarantee

Also Many Spares Prices on Application

eg Spectrum Membrane	£5.00
Spectrum+ Membrane	£10.00
Comm 64 Power Supply	£25.00
Spectrum Power Supply	£14.00

All Prices Include VAT
While-You-Wait Service Or Send Computer with Cheque to include £2.00 P&P to:
THOMAS WALKER AND SON LTD.
37-41 Bissell Street, Birmingham B5 7HR
Tel: 021 622 4475

HEATH COMPUTERS & ELECTRONICS LTD.
We specialise in Commodore Repairs
Also BBC's
★ FAST TURNAROUND ★
★ FIXED PRICE REPAIRS ★
★ ★ ALSO SELL SPARES ★ ★
Tel: Birmingham (021) 771 3636

NEXT COPYDATE
29th MAY

FAST COMPUTER REPAIR CENTRE — LONDON
★ BBC Micro, Commodore, Spectrum
★ Amstrad, Others
★ We sell spare parts
★ Used Micro Bought and Sold
★ Eprom Programming Service
PHONE 01-863 7166
PROMPT ELECTRONICS
Unit 14, Springfield Road, Harrow, Middx, HA4 1QF. Entrance in Amersham Road.

COMPUTER REPAIRS
SPECTRUM, COMMODORE, AMSTRAD, ACORN, BBC etc.
Fixed charge repairs on all makes
Please ring for details:
MCE SERVICES
33 Albert Street, Mansfield, Notts NG18 1EA
Tel: 0623 653512

FOR ALL GENUINE COMMODORE
SPARES + REPAIRS
OASIS
Telephone for more details: (Amesbury) 0980 24599

NEXT COPYDATE:
29th MAY

COMPUTER REPAIRS
Fixed Super Low Prices!
Inclusive of parts, labour and VAT
FIRST AID FOR TECHNOLOGY

1 week turnround Free collection/delivery available for local area

★ INTRODUCTORY OFFERS ★

SPECTRUM	£14 inc. + Free Game	ELECTRON	£19 inc.
C64	£22 inc. + Free Game	AMSTRAD 464	£32 inc.
C16	£18 inc.		+ Free Game
VIC20, C+4	£22 inc.	C & N CASSETTE UNITS	£19 inc.
BBC	£32 inc.	C64 P.S.U. for sale	£20 inc.

Please enclose payment with item - 3 month warranty on repair. Please enclose advert with repair
W.T.S. ELECTRONICS
5-9 Portland Road, Luton, Beds LU4 8AT. Tel: 0582 458375. Telex: 265871

CROYDON COMPUTER CENTRE
29 Brigstock Road, Thornton Heath, Surrey, CR4 7JJ Tel: 01 683 2646
COMPUTER SERVICING
(Est'd since 1979)
We repair — on the premises — quick turnround
★ Commodore & Spectrum
★ BBC & Electron (Approved Service Centre)
★ Amstrad & Torch (Approved Service Centre)
★ Disc Drives, Printers, Monitors
Mail Orders by phone Access & Visa accepted

MICRO WORKSHOP
COMMODORE REPAIR SPECIALISTS
Also repair Sinclair, Amstrad and BBC.
3 month warranty
12 Station Approach, Epsom, Surrey.
Telephone: 03727 21533

SPECIALIST COMMODORE REPAIRS

Commodore 64	£20.00
1541 Logic Fault	£20.00
1541 Alignment	£18.00
CBM Modem	£14.00
Commodore C16	£15.00
Commodore +4	£15.00

All repairs carried out using the latest diagnostics and test equipment. This ensures a faster repair to your computer or peripheral.
When the fault has been rectified we final test with checksum diagnostics to ensure any new components fitted function correctly.
There is no extra charge for posting. All prices fully inclusive. (No Hidden Extras).
Other Commodore Home Computers and Peripherals repaired on request. Don't hesitate to phone:

I. Bateman Specialist Computer Repairs
Telephone: Corby (0536) 69454 24 hour answering service

B R E A K

Plus/4 Cribbage

A number of people seem to be having problems entering our Cribbage program published in our April 1987 issue. There are no problems with this program as printed.

Problems are occuring where people haven't read our **Listings** page which explains the series of symbols that we use to make program entry easier. If you read the Listings page you will see that a[C letter] means that you should hold down the Commodore key and press the relevant letter. [S letter] means press SHIFT and the letter. You never type the square brackets.

The only symbols that may cause problems are the [130] and [132]. These are simple the codes for flash on and flash off. Refer to your manual to see how you enter these. YC

Calling All Hippies

All you aged hippies, or would be hippies who were born too late, will no doubt be overjoyed to hear that Domark has launched the long awaited *Baby Boomer* edition of the popular *Trivial Pursuit* computer game. It's priced at £14.95 for the full game version or just £7.95 if you already own the original computer version.

Mark Strachan and Dominic Wheatley of Domark, normally seen in suits and bow ties, celebrated the launch by regressing back to their dim and distant past with a visit to London's Carnaby Street.



We at *Your Commodore* feel that you can think of some suitably apt caption to go along with a picture of this long haired duo and to back this up we are giving away a fiver to the best caption.

Send your witty prose to: *Your Commodore,* Boomer Caption Competition, 1 Golden Square, London W1R 3AB.
Entries must reach our office by Friday 26 June 1987. YC

Editor: Stuart Cooke
Assistant Editor: Marie Curry
Editorial Assistant: Stuart Kirkham
Senior Advertisement Manager: Peter Chandler
Assistant Advertisement Manager: Stuart Taylor
Advertisement Copy Control: Laura Champion
Origination: Ebony Typesetting
Design: Argus Design Studio

Your Commodore incorporating Your 64 is a monthly magazine appearing on the first Friday of each month.
Argus Specialist Publications Limited Editorial & Advertisement Office, Your Commodore, No 1 Golden Square, London W1R 3AB. Telephone: 01-437 0626 Telex: 8811896.
Subscription rates upon application to Your Commodore Subscriptions Department, Infonet Ltd, Times House, 179 The Marlowes, Hemel Hempstead, Herts. HP1 1BB.

ISSN 0269-8277

ABC
MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

"U.S. Top Seller is British"

CBM 64 and CBM 128 40 + 80 Column Versions



The Essential Package

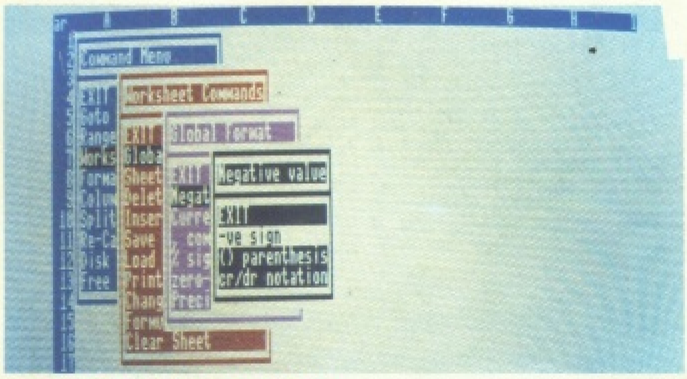
Over there they call it Swift-Calc; over here we just call it Swift, but whatever you call it, it's the most affordable and easy-to-use professional quality Spreadsheet around!

The Americans have voted with their wallets and made Swift one of the top ten Home Management programs, according to the highly respected Billboard chart. But it's British, written by Dave Middleton of Metamorphosis Developments, and published in the UK by Audiogenic Software.

Swift Spreadsheet is the essential financial modelling package. Use it in business, at home, or in your club or society to help you in budgetting, costing, quotations, household financial planning, or any task where the manipulation of figures is involved.

Swift will prove indispensable in forecasting and decision-making due to its 'What If' capabilities – it can show you instantly how results are affected when you change one or more of the contributory factors.

Even if you haven't used a Spreadsheet before, you will soon be able to harness the power of Swift to your own special requirements.



WHAT THE REVIEWERS SAY

"Companies are spending thousands of pounds on micros running Lotus 1-2-3...home users have access to similar powerful programs like Audiogenic's Swift Spreadsheet" The Guardian

"This product is so outstanding in so many ways" Commodore Horizons

"Audiogenic's Swift Spreadsheet is far and away the best of the low-cost spreadsheets for home micros" Sunderland Echo

VERSIONS AVAILABLE

Commodore 128 and 64 – both versions on one disk
Commodore 128 and 64 – both versions on one cassette
Atari 800XL and 130XE – both versions on one disk
Atari 800XL and 130XE – both versions on one cassette
BBC-B (40 Column screen display) – EPROM

Best Value Package Ever at £24.95 (BBC version £29.95)

ONLY SWIFT CAN GIVE YOU ALL THESE FEATURES...

- Easy to use – With pop-up menu control.
- Easy to learn – Comes with an instruction manual that is comprehensive and comprehensible.
- Enormous Spreadsheet area – Cell matrices are A1 to BL254 (Commodore 128 and Atari 130XE); A1 to Z254 (Commodore 64 and Atari 800XL); or A1 to Z126 (BBC-B).
- Professional 80 column screen display – On Commodore 128 version only (RGB monitor required).
- Highly flexible cell formatting – Column widths individually variable, user definable decimal precision, and text formatting to left, right or centre.
- Lots of numerical display options – Minus signs, debit brackets or cr/dr notation for negative values, currency symbols, percent sign, etc.
- Simultaneous display of two sheet areas – Horizontal or vertical split-screen facility.
- Graphical display option – Converts cell values into bar graphs.
- Can be used by unskilled operators – Automatic execution of pre-programmed operational sequences.
- BBC version supports both Tape and Disk filing systems – Comes as an EPROM chip.
- Commodore version gives easy interface to parallel printers – Built-in Centronics Interface.

Order now by phone...(0734) 303663

Swift is the Trade Mark of Metamorphosis Developments Ltd.
Now available from...
WH Smith, Boots, Laskys and all good software dealers.

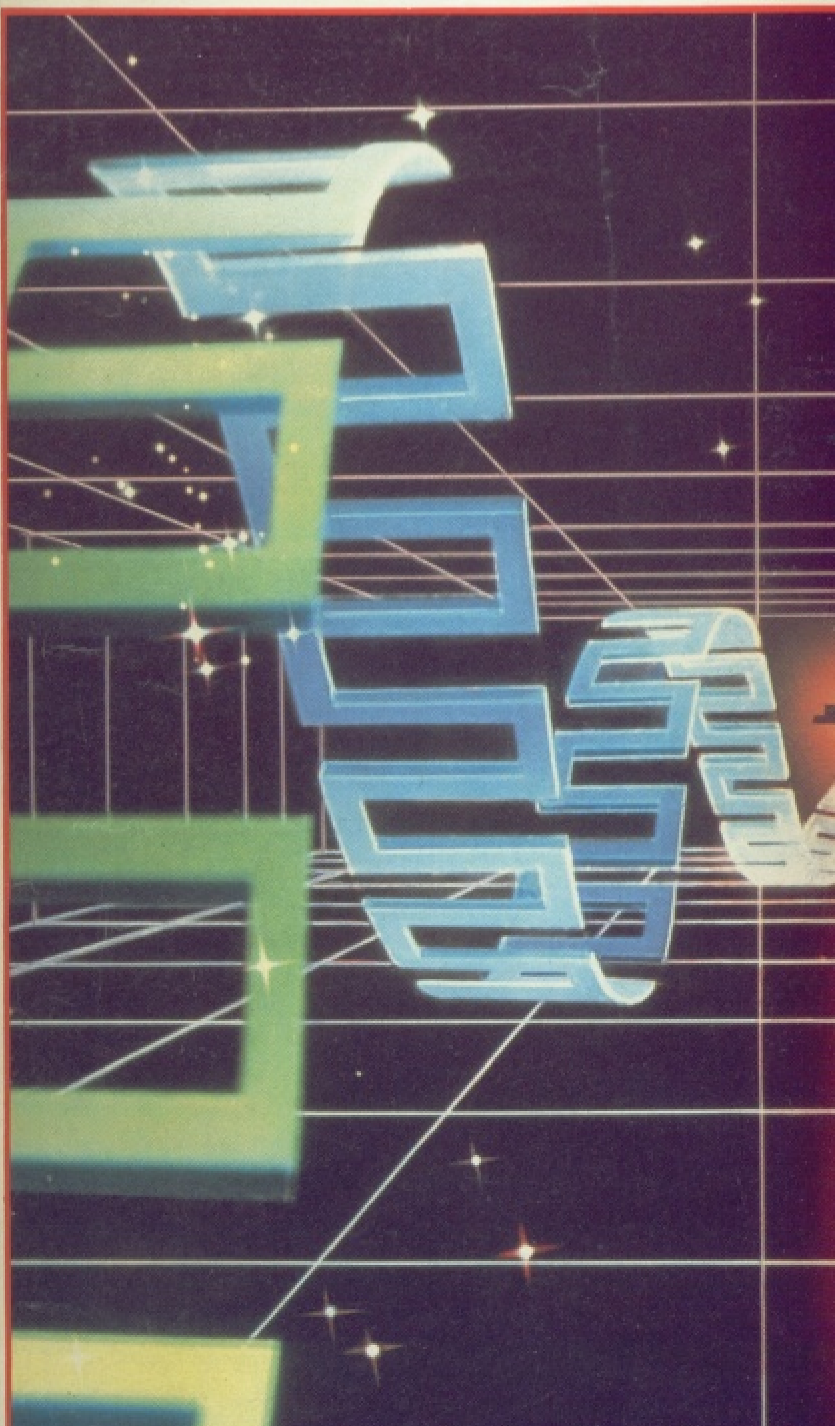
Audiogenic Software Ltd.

PO Box 88 Reading Berkshire RG7 4AA

YOUR COMMODORE JUNE 1987
VOL 3 NO 9

YOUR COMM...

AN ARGUS SPECIALIST PUBLICATION



MACHINE CO...
DEVELOPMENT...

EMULATOR 64...
ANALYSER 128...
64 SOURCE GE...

◆ PLUS/4 DUAL PROGRAMMIN...
◆ IMPROVE C64 LISTINGS ◆ W...